Urban Geospatial Data and Services on Bhuvan Geoportal

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Presentation Contents

- Introduction: Relevance of Bhuvan for Urban Applications
- Bhuvan Data: Urban Geospatial Data Resources
- Bhuvan Applications : Master Plan Formulation
- Urban Science for Smart City Concept

Bhuvan (www.bhuvan.nrsc.gov.in)

Geo-portal of ISRO

Visualization of Multi-resolution Images

Free data download (NOEDA)

Application Enabled

Crowd Sourcing Enabled

Public good Services

Government Platform to Share the data

Platform to host dept/ user applications

VISUALIZATION

Bhuvan 2D

Bhuvan 3D

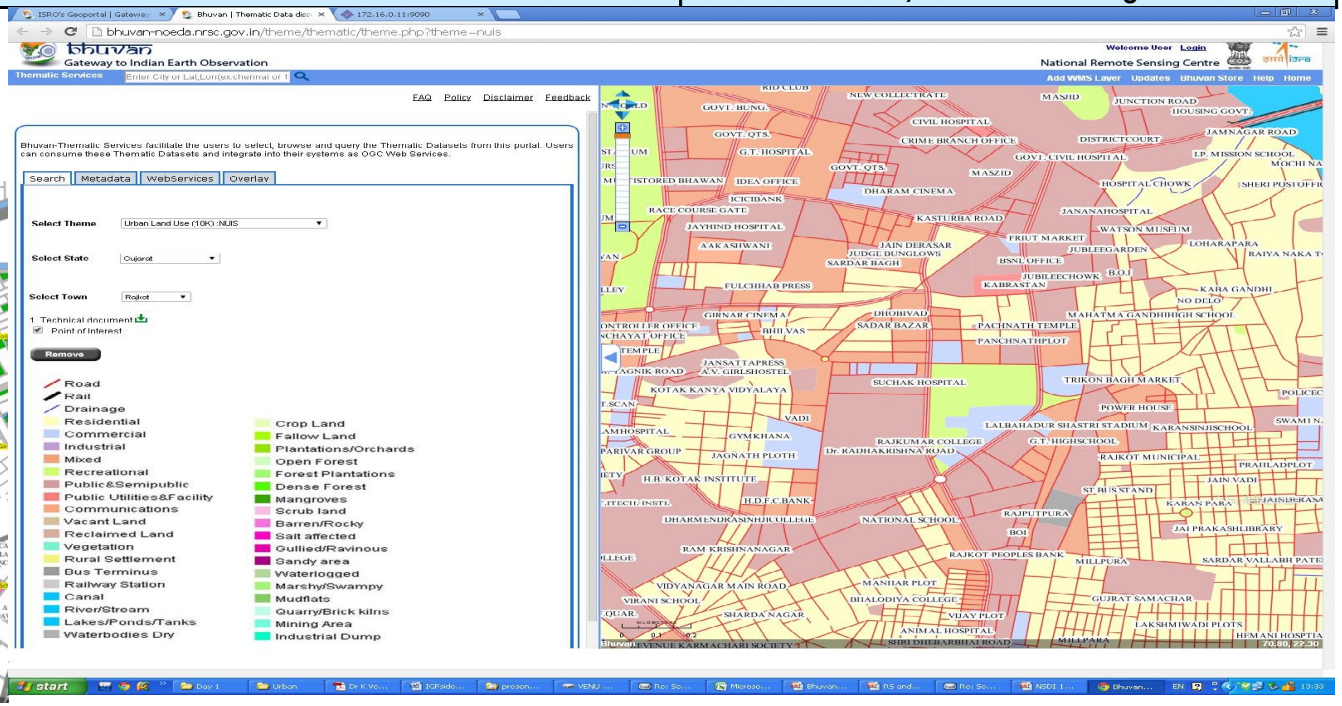
Multi-resolution Satellite data

- ✓Cartosat-1
- ✓Cartosat-2
- Resourcesat 1 - AWiFS
- Resourcesat 1- LISS III
- ✓Resourcesat 1 LISS IV
- Oceansat-1- OCM
- Oceansat-2- OCM

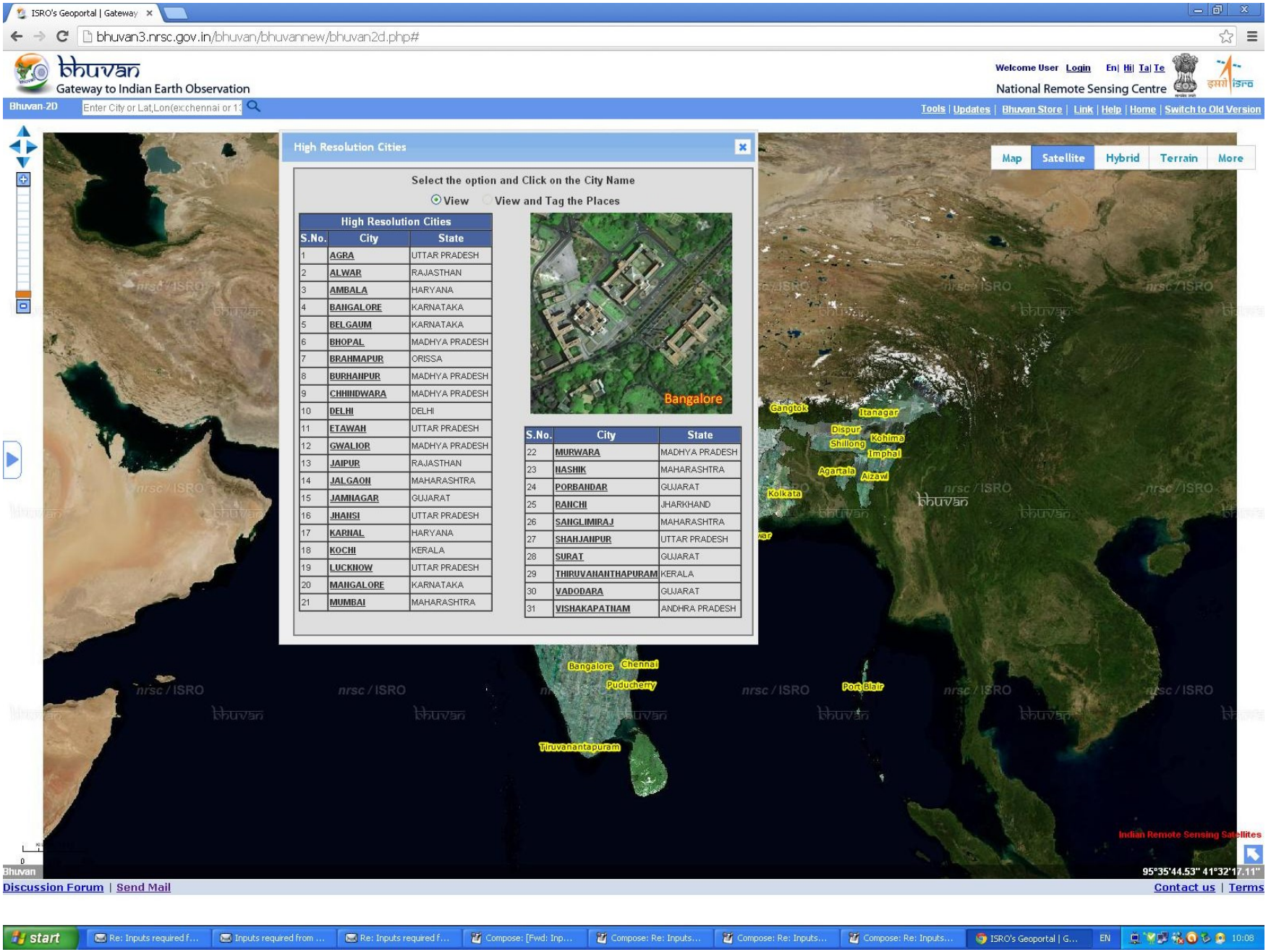
Mobile Bhuvan

Thematic Maps

Landuse Landcover- 1:50k , 2006-06	Geomorphology and Lineaments – 2005-06
Landuse Landcover- 1:50k , 2011-12	Flood Annual Layers, Hazards
Landuse Landcover- 1:250k, 2004- 05 to 2011-12	**NUIS 1:10,000 150 Towns**
Wastelands- 2008-09	**Natiowide 1:10,000 - Continuing**



High Resolution Satellite data



Scope:

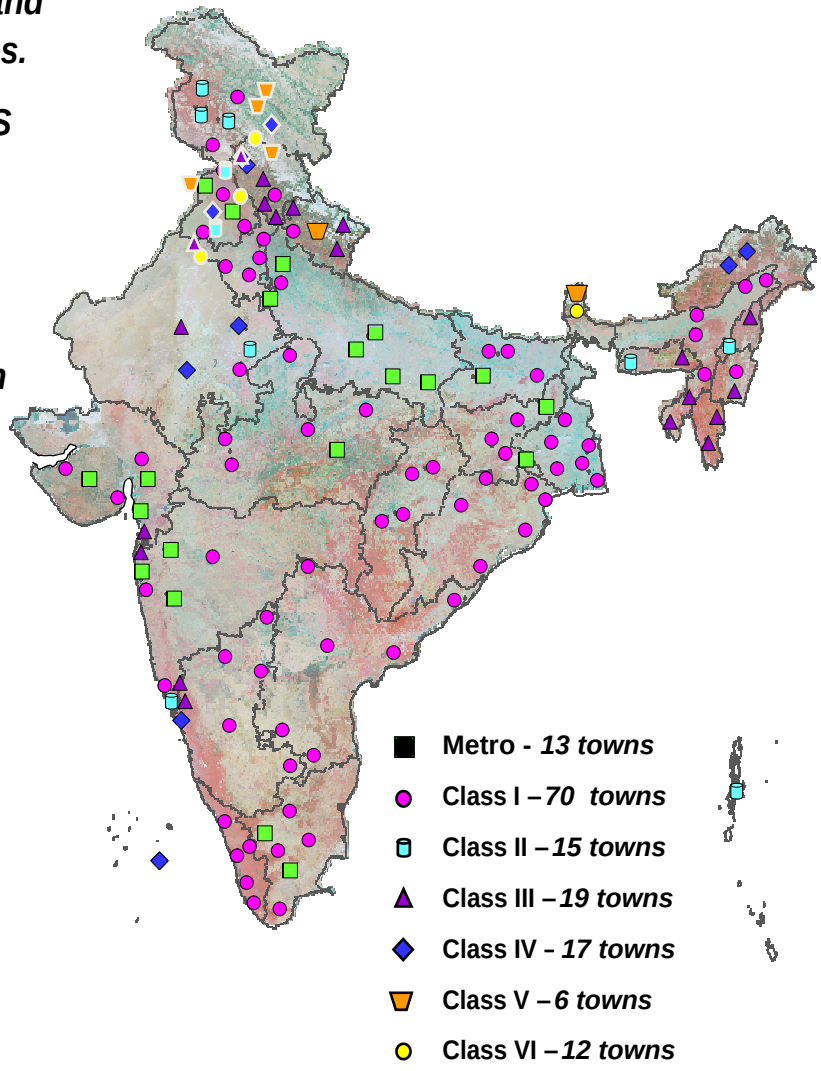
- *Generation of Multi scale (10K,2K&1K) hierarchical Urban Geospatial database including thematic data for various levels of Urban Planning, Infrastructure development and e-governance using satellite, Aerial and GPR techniques.*
- *Total of 152 towns are covered for mapping under NUIS scheme.*

Input data:

Cartosat-1 and LISS-IV MX satellite data, Collateral data from Urban local bodies and other secondary sources

Database creation:

Thematic database of 1*2 primary layers of Base, Urban Landuse, Geology/ Geomorphology and Soils along with 4 incorporated layers of administrative boundaries, forest boundaries, city/town boundaries, Settlement locations on 1:10,000 scale.*



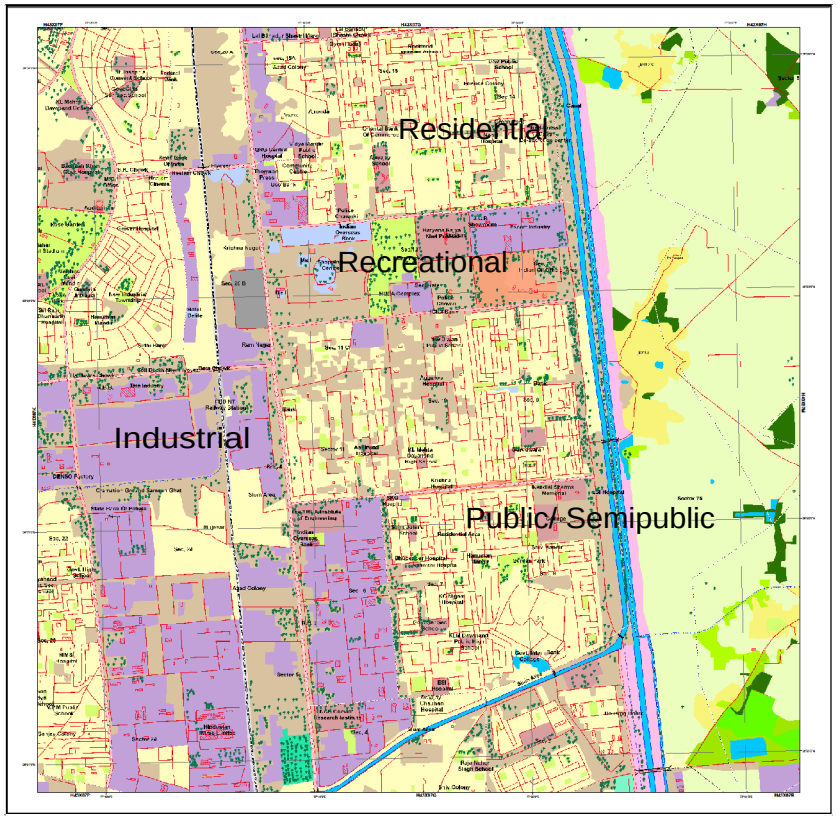
SNAPSHOTS OF NUIS DATABASE FOR TOWNS IN HARYANA STATE

- In Haryana, 5 towns were selected – Faridabad, Karnal, Panipat, Rohtak, Hisar.
- Out of the Five towns , Four are NCR towns.

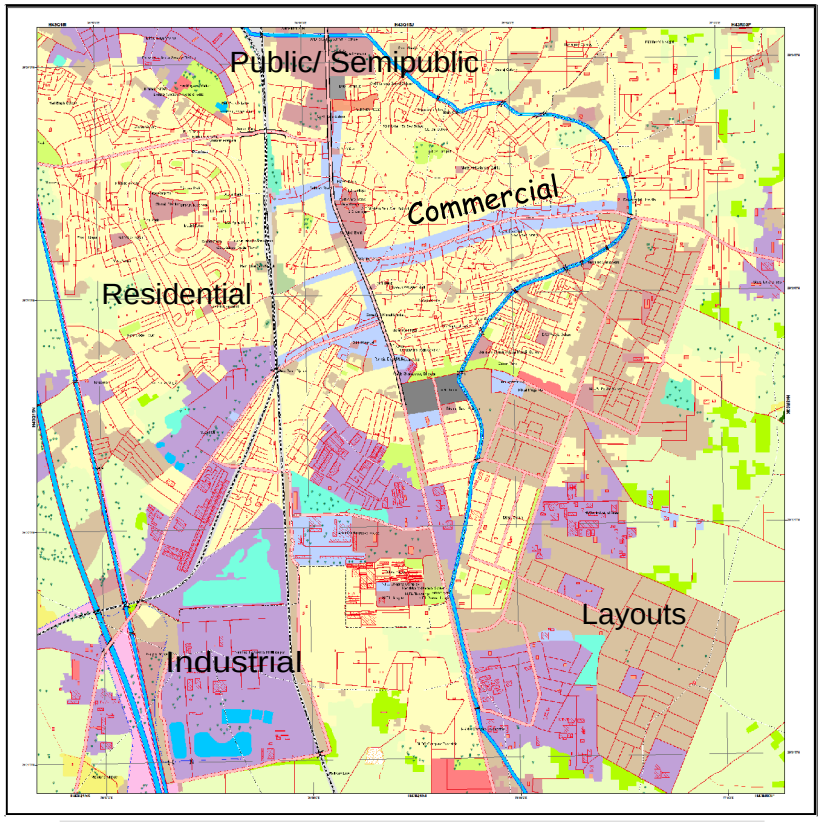
Town Name	Faridabad	Panipat	Rohtak	Karnal	Hissar
Area mapped (sq.km)	468	311	273	76	306

One 3' x 3' Mapsheet (~ 28sq.km) for each town

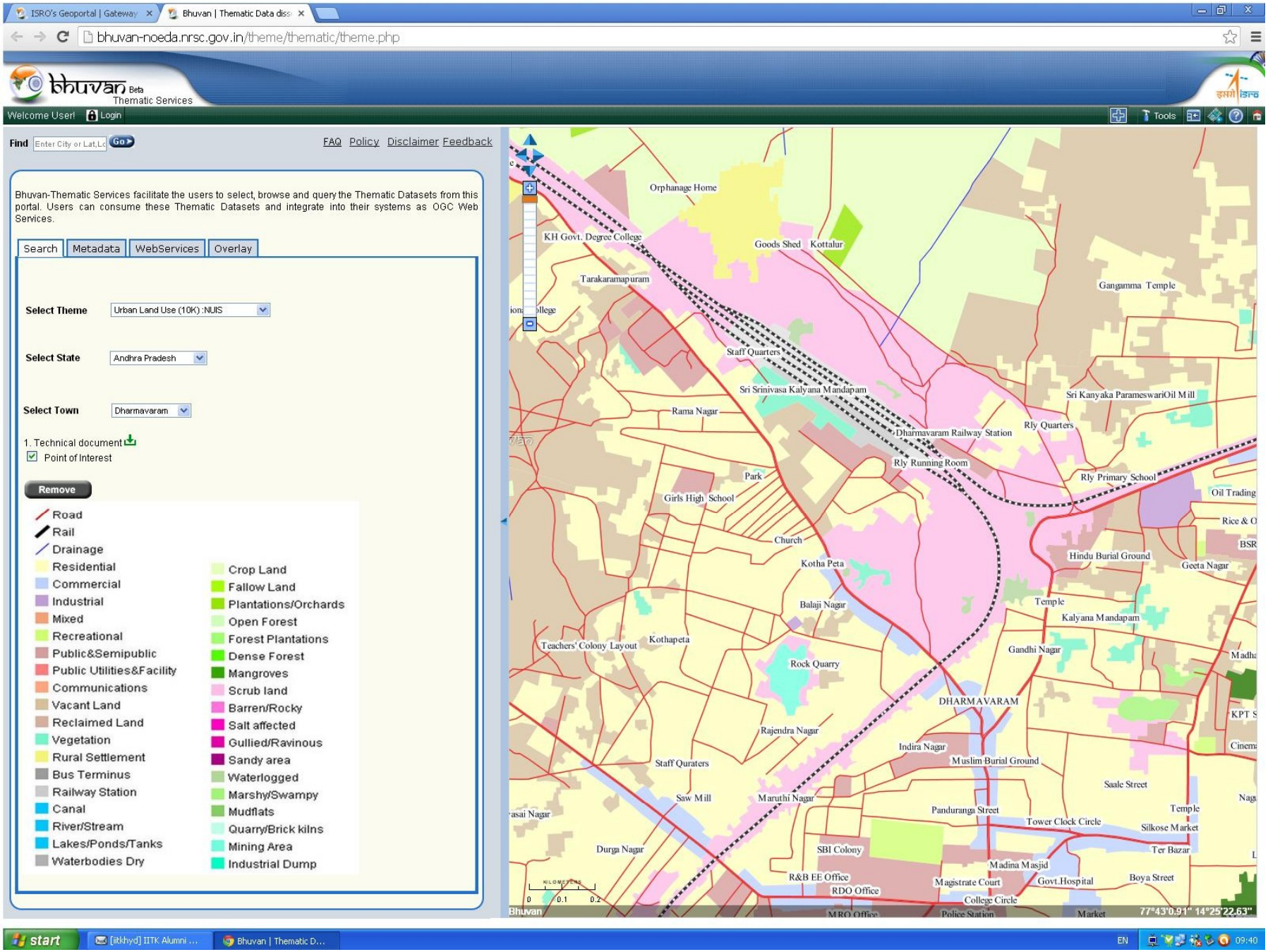
Faridabad



Panipat



Large Scale (1:10,000 Scale) Urban Geospatial data for 152 Towns



Bhuvan - Gateway to Indian | ISRO's Geoportal | Gateway | Bhuvan | ISRO's Geoportal | Bhuvan | Thematic Data diss | Parliament: Latest News on

bhuvan-noeda.nrsc.gov.in/projects/tourism/tourism.php?tourismid=1

bhuvan Beta
Indian Earth Observation Visualisation

Tourism : Amritsar

Welcome Bhuvanite

Visit | Stay | Food Hubs | Services | Travel | Economic | Religious | Shopping | Others | Heritage Walk | Download | Tools

See the City: Amritsar,Punjab

Search

Top Destination | Travel | Hotel

- Gurudwara San Sahib
- Janam Asthan Guru Amar Dass Ji
- Theh Baba Shah Dal Peer
- Pujaya Mata Lal Devi Temple
- Sun City Amusement Water Park
- Guru Nanak Dev University
- Khalsa College
- Rambagh Garden
- Jalianwala Bagh

Search NearBy | Get Directions

- Darshini Deori

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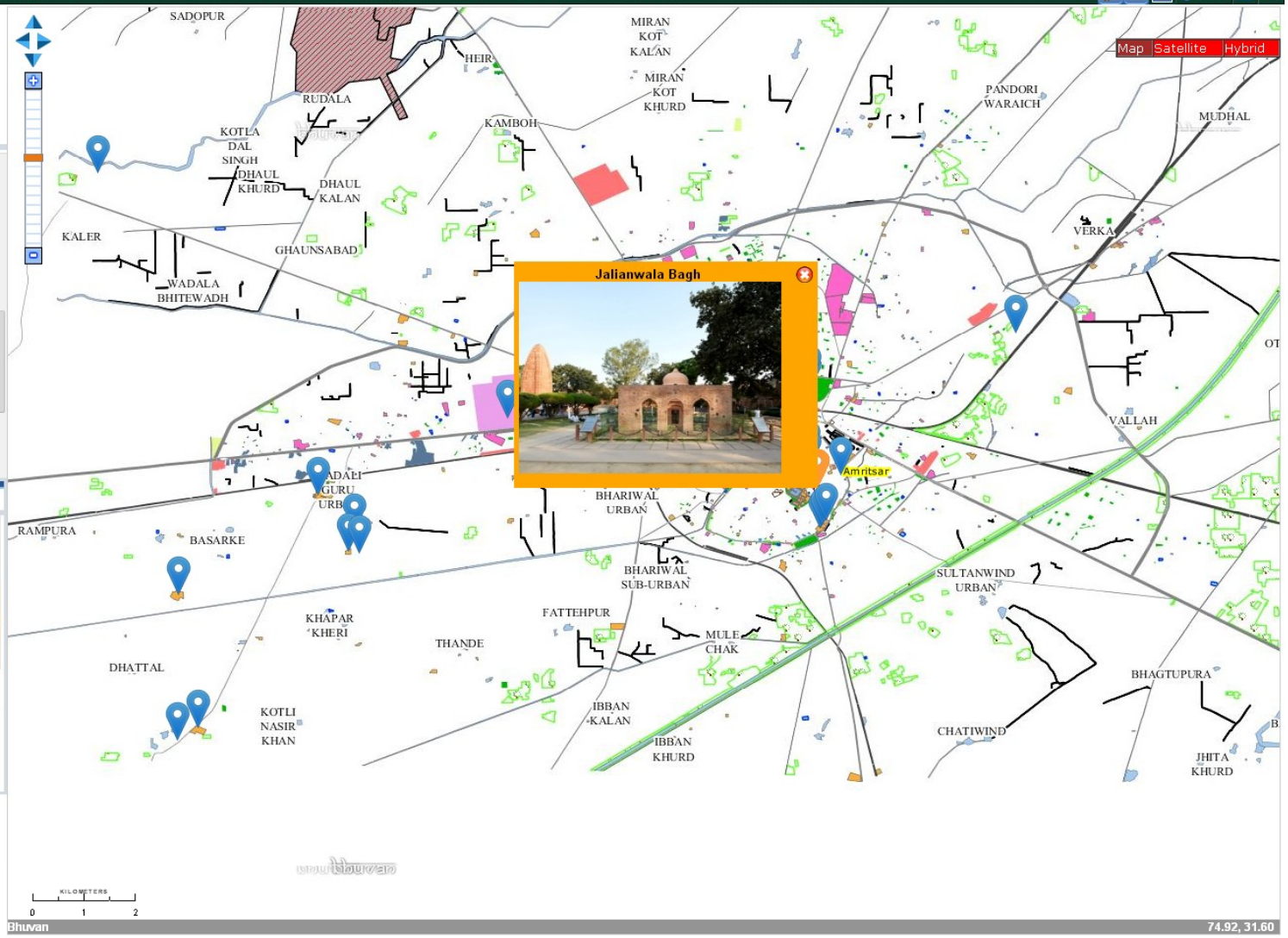
Amritsar historically also known as Ramdaspur and colloquially as Ambarsar) is a city in the north-western part of India. It is the spiritual center for the Sikh religion and the administrative headquarters of the Amritsar district in the state of Punjab.



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Bhuvan - Gateway to Indian | ISRO's Geoportal | Gateway | Bhuvan | ISRO's Geoportal | Bhuvan | ISRO's Geoportal | Bhuvan | ISRO's Geoportal | Bhuvan | Thematic Data diss | Parliament: Latest News on F

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bhuvan Beta
Indian Earth Observation Visualisation

Tourism : Nalanda

Welcome Bhuvanite

Places To Visit

Tools

See the City: Nalanda,Bihar

Map | Technical Document

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Nalanda, Nala, Nalaka and NalakaGrama are all variants of the same place as reported in various Buddhist and Tibetan texts of the 17th century. It is an ancient Buddhist ruin located close to the village of Bargaon, 90 km southeast of Patna and 11 km north of Rajgir.

Map | Satellite | Hybrid

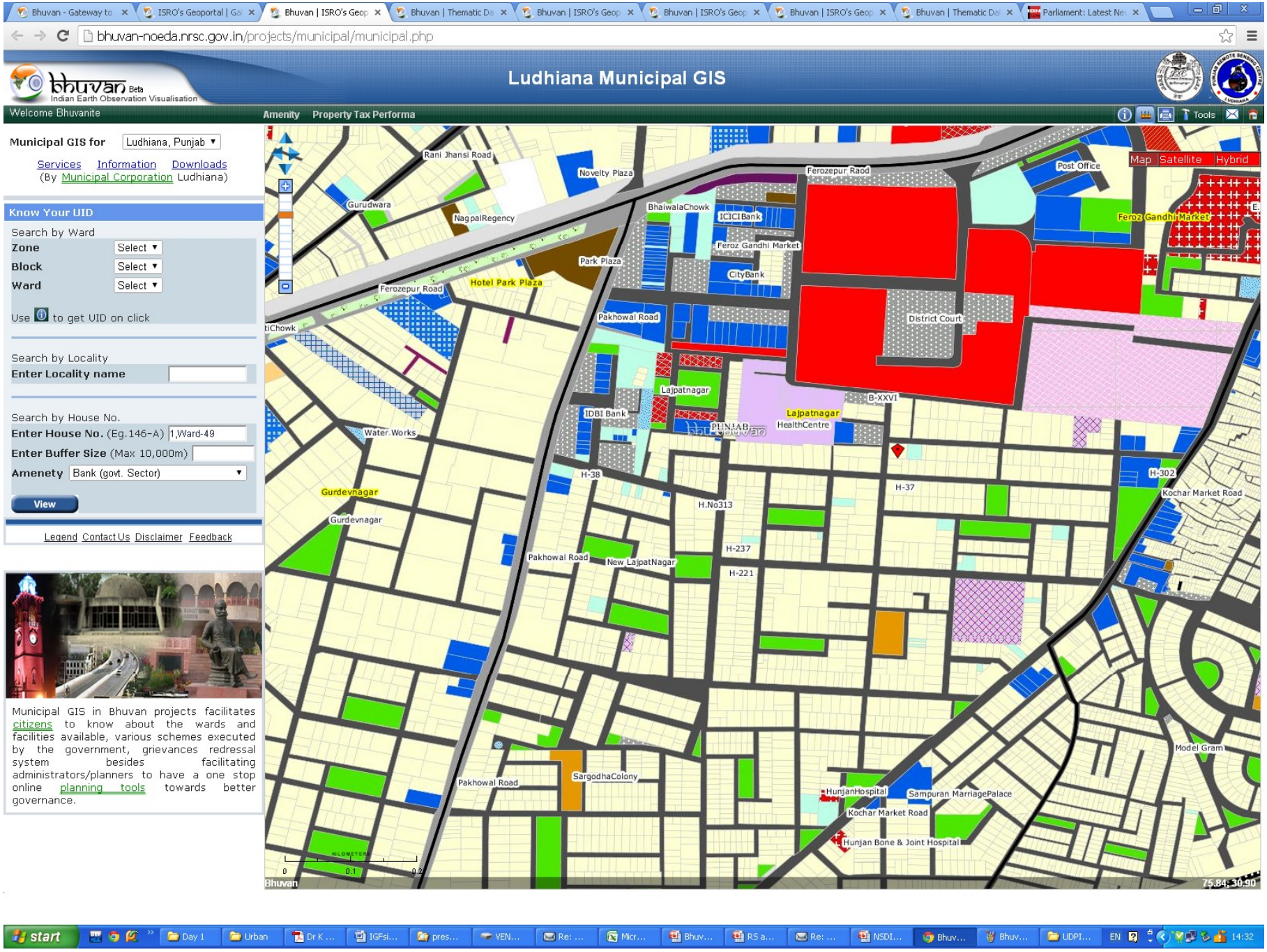
Dehar Pokhar
Banial Pokhar
Temple No.14
ASI Compund Wall
Buddha Temple outside the site
Temple No.13
Monastery No.10
Monastery No.9
Temple No.2
Monastery No.7
Sarai Mound Stupa (Temple No.4)
Monastery No.6
Monastery No.5
Pathway
Entrance Gate
Monastery No.1
Monastery 1B
ASI Main Office
ASI Museum
Godahan Tank
Nalanda
Muzaffarpur Village
Kargidya Tank

KILOMETERS
0 0.1 0.2

Bhuvan

85.45, 25.13

start | Day 1 | Urban | Dr K ... | IGFsi... | pres... | VEN... | Re: ... | Micr... | Bhuv... | RS a... | Re: ... | NSDI... | Bhuv... | Bhuv... | UDPI... | EN | 14:29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Ludhiana Municipal GIS
Welcome Bhuvanite
Amenity
Property Tax Performa
Tools
Municipal GIS for
Ludhiana, Punjab
Services
Information
Downloads
(By Municipal Corporation Ludhiana)
Know Your UID
Search by Ward
Zone
Block
Ward
Select
Use to get UID on click
Search by Locality
Enter Locality name
Search by House No.
Enter House No. (Eg.146-A)
1,Ward-49
Enter Buffer Size (Max 10,000m)
Amenety
Bank (govt. Sector)
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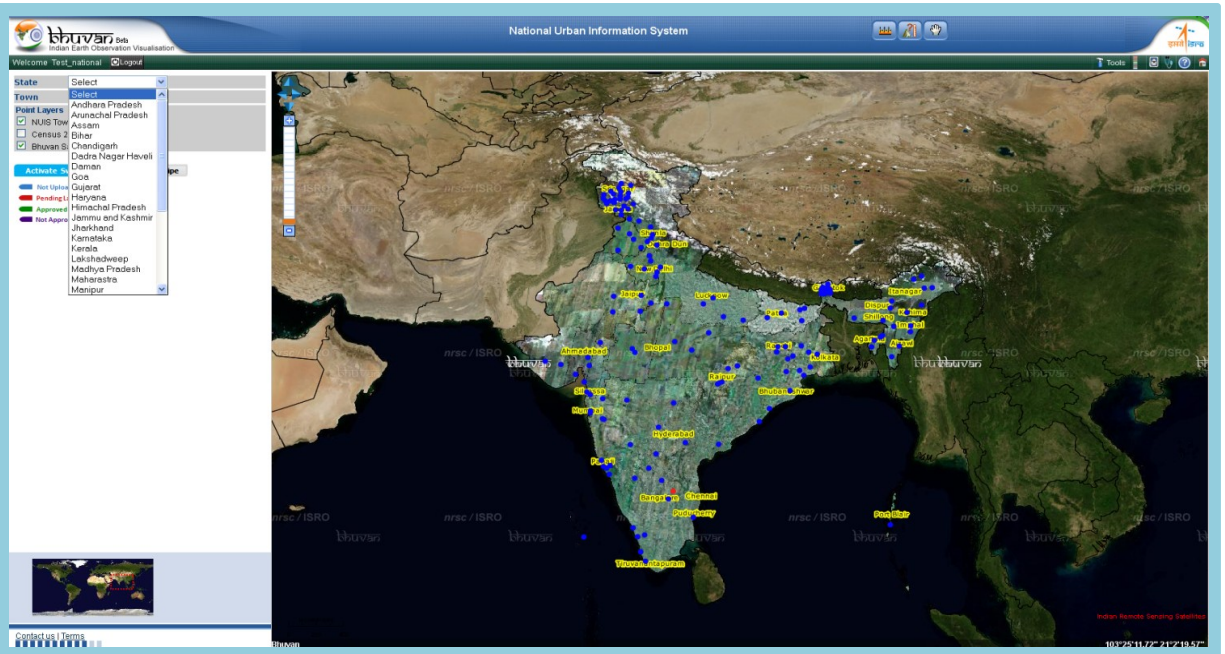
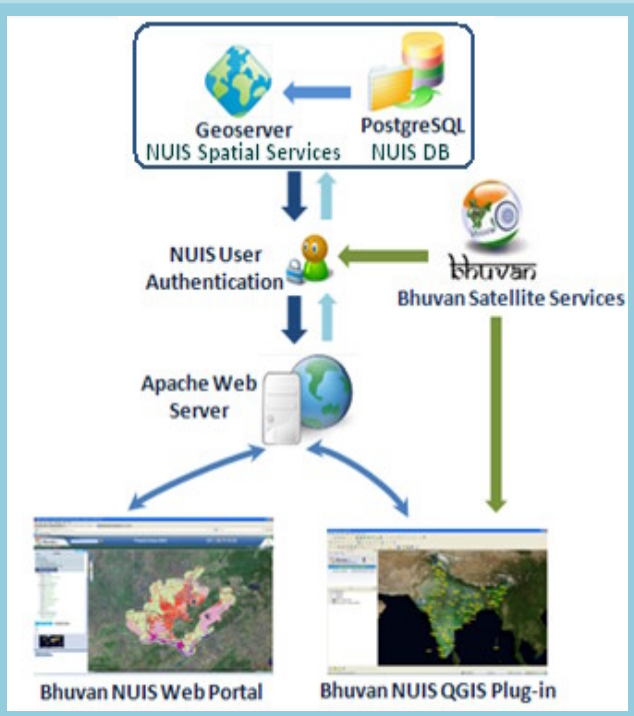
Municipal GIS in Bhuvan projects facilitates citizens to know about the wards and facilities available, various schemes executed by the government, grievances redressal system besides facilitating administrators/planners to have a one stop online planning tools towards better governance.
Rani Jhansi Road
Novelty Plaza
Ferozepur Raod
Post Office
Map
Satellite
Hybrid
Gurudwara
NagpalRegency
BhaiwalaChowk
ICICI Bank
Feroz Gandhi Market
Park Plaza
CityBank
Ferozepur Road
Hotel Park Plaza
Pakhowal Road
District Court
Lajpatnagar
B-XXVI
IDBI Bank
Lajpatnagar
HealthCentre
Water Works
H-38
H-37
H-302
Kochar Market Road
Gurdevnagar
H.No313
H-237
Pakhowal Road
New LajpatNagar
H-221
Model Gram
SargodhaColony
Pakhowal Road
HunjanHospital
Sampuran MarriagePalace
Kochar Market Road
Hunjan Bone & Joint Hospital
Bhuvan
75.84, 30.90
start
Day 1
Urban
Dr K ...
IGFsi...
pres...
VEN...
Re: ...
Micr...
Bhuv...
RS a...
Re: ...
NSDI...
Bhuv...
Bhuv...
UDPI...
EN
14:32

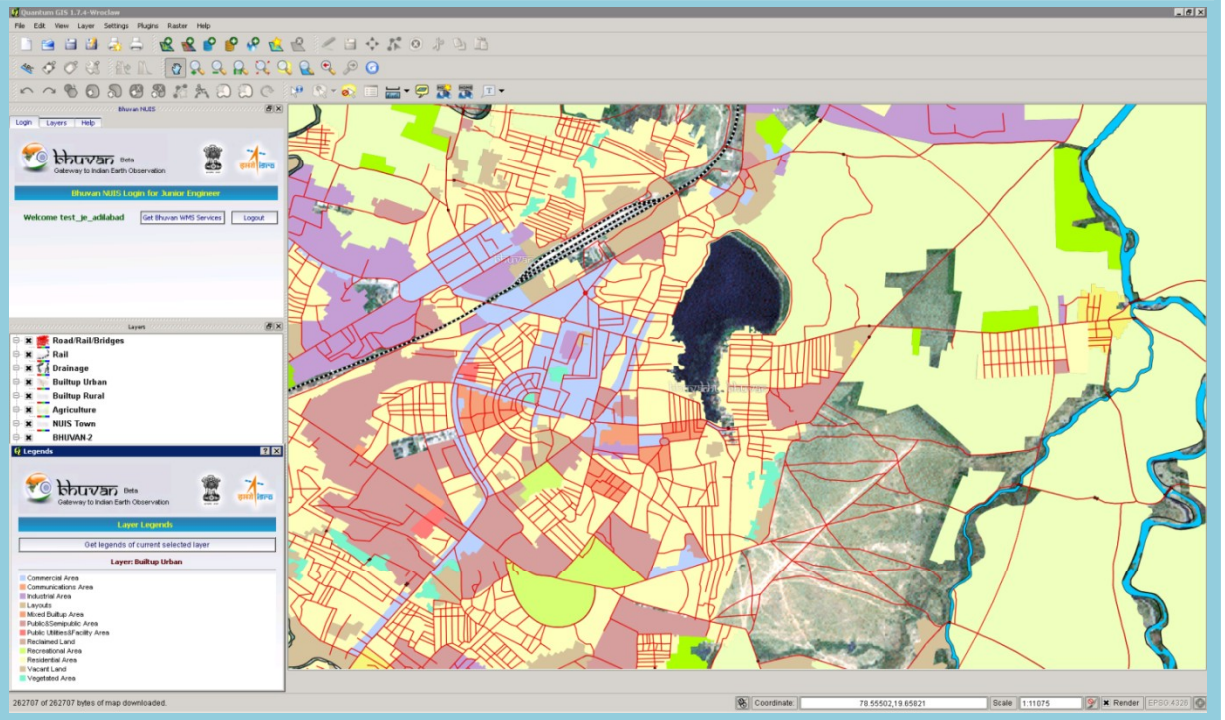
Bhuvan NUIS: Preparation of urban plans by the Urban Local Body's(ULB's) using Bhuvan services.

Salient features-

- NRSC/ISRO has completed the preparation of 1:10000 scale urban geo spatial database for 152 town under the National Urban Information System program.
- 150 towns (Ministry of Defence cleared) urban database has been uploaded and available in Bhuvan NUIS citizen chapter as services.
- Bhuvan NUIS application has been developed to enable the respective ULB's to use the NUIS for preparation of city/town Master plans.
- Bhuvan NUIS application is developed using open source technologies.
- With the initiative of Ministry of Urban Development (MoUD) NRSC/ISRO is organizing National level capacity building program for Bhuvan NUIS application.







NUIS -BHUVAN for City Developmental Plans (CDPs)

- For Urban Planners: National level single window Urban Geo-portal for Satellite imagery and geospatial data (creating, uploading existing data and updating) for Urban planning / monitoring by the Urban Local Bodies in secured (User-ID and Password) environment.
- For Citizens: Geospatial data as maps & service
- Presently 2.5m NCC satellite imagery and MOD cleared 149 NUIS towns 10K geospatial data are available
- Govt. of AP has approved to upload 67 towns Master plans.

Main Features

Existing Data

- NUIS and Town Specific databases
- Master plans
- Documents

NUIS-Bhuvan Web Application

- Status Updation
- Data versioning
- Proper logging
- Feedback

Citizen View

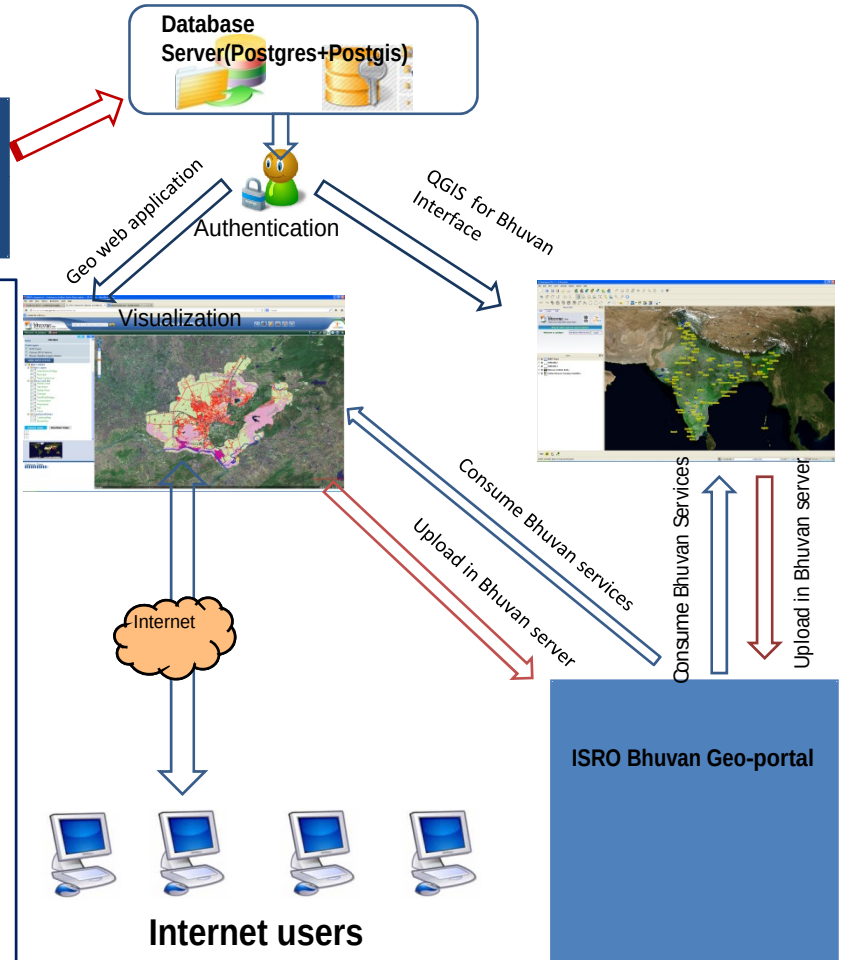
- Overlay of Master Plan.
- Overlay of vector layers.
- Time series visualization.
- Feed back

Town specific View :Authentication to specific town

- Junior Level Officer
  - Create & Upload data(Raster and vector)
- Second Level officer
  - Approve or Reject the data after visualization
  - Status Update alert Massage
  - Secure Password on mobile
- Higher Level Officer
  - Visualization

State specific view :Authentication to all towns in state

Nation al View: Authentication to state wise all towns



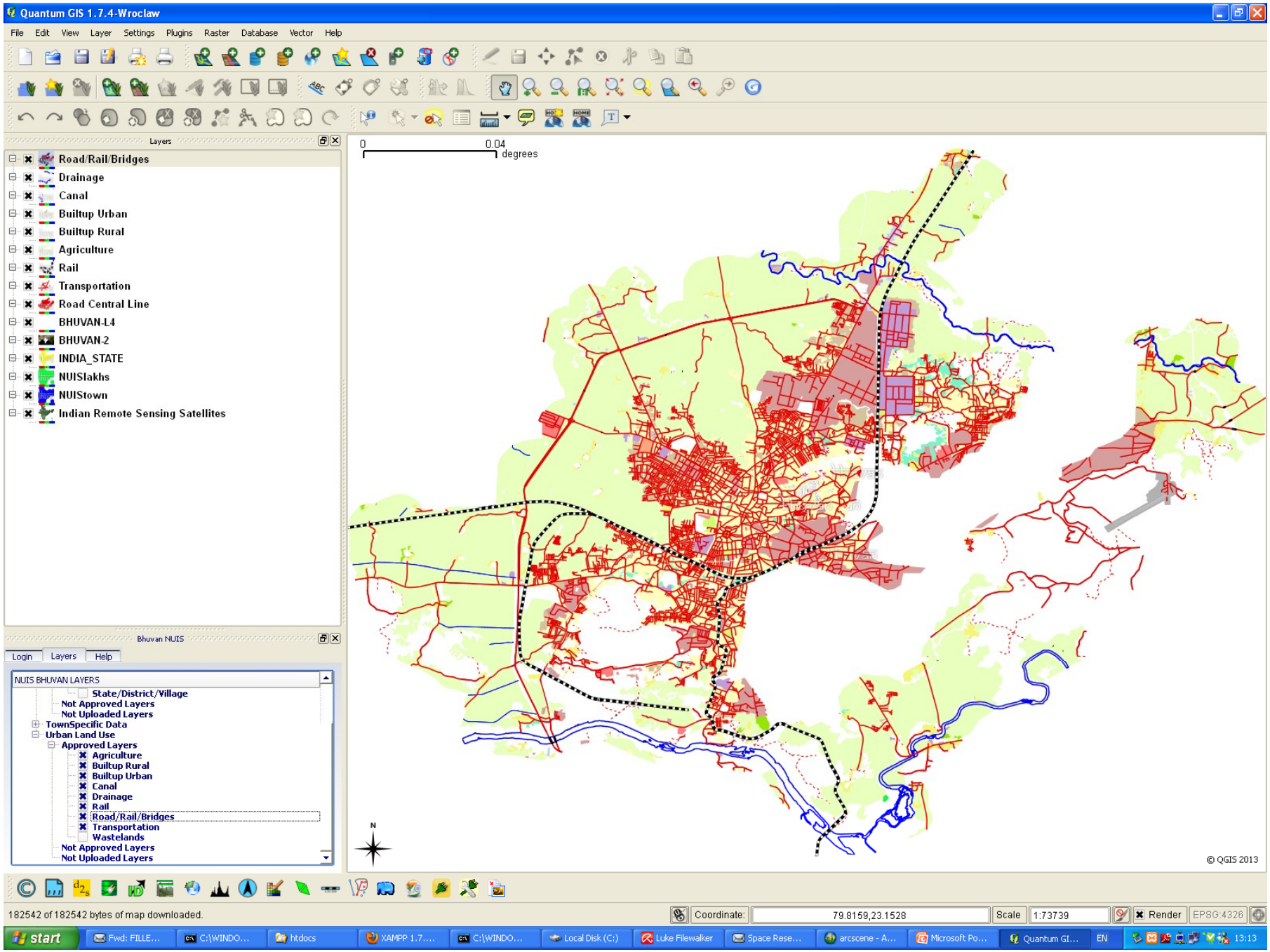
Open Source Technology

Creation and Updation QGIS NUIS-Bhuvan

- Single point data management.
- Client to Bhuvan server communication.
- Consuming of Bhuvan satellite services for change visualization in single click.
- Data uploading from client end without browser based environment.
- Serving the uploaded data as web map service.
- Hierarchical user management and data versioning at server end.
- Proper logging and data archival .
- Modification of existing data at client end and updation at server end and using Bhuvan web services.
- Single point data management.
- Help module for Plug-in functionalities.

ISRO Bhuvan Geo-portal

- Multi-sensor time series satellite data.
- Satellite data Download;
- Thematic Services;
- User response and discussions;
- Terrain profile and other data and information services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Drainage
Canal
Builtup Urban
Builtup Rural
Agriculture
Rail
Transportation
Road Central Line
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State/District/Village
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Not Uploaded Layers
TownSpecific Data
Urban Land Use
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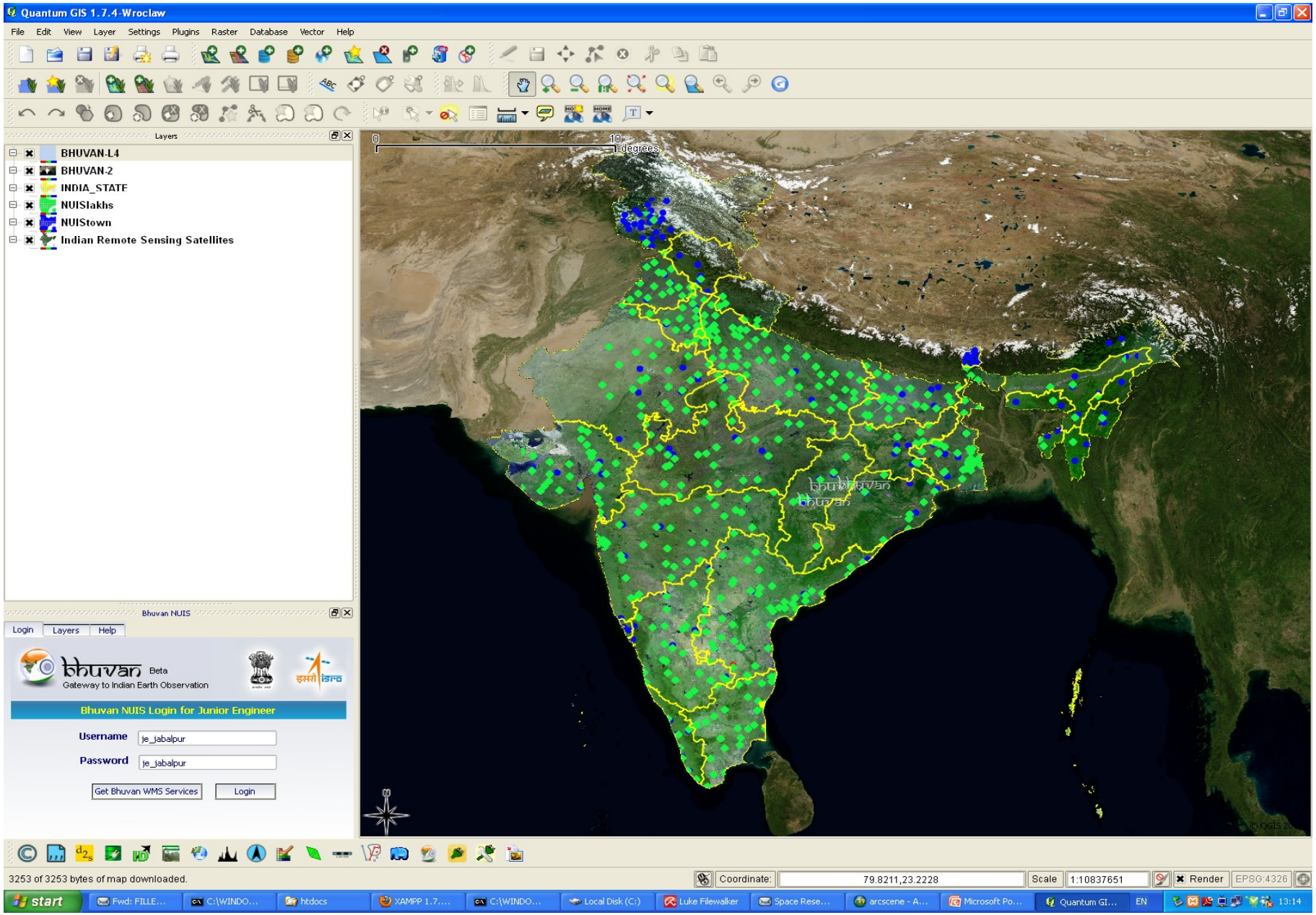
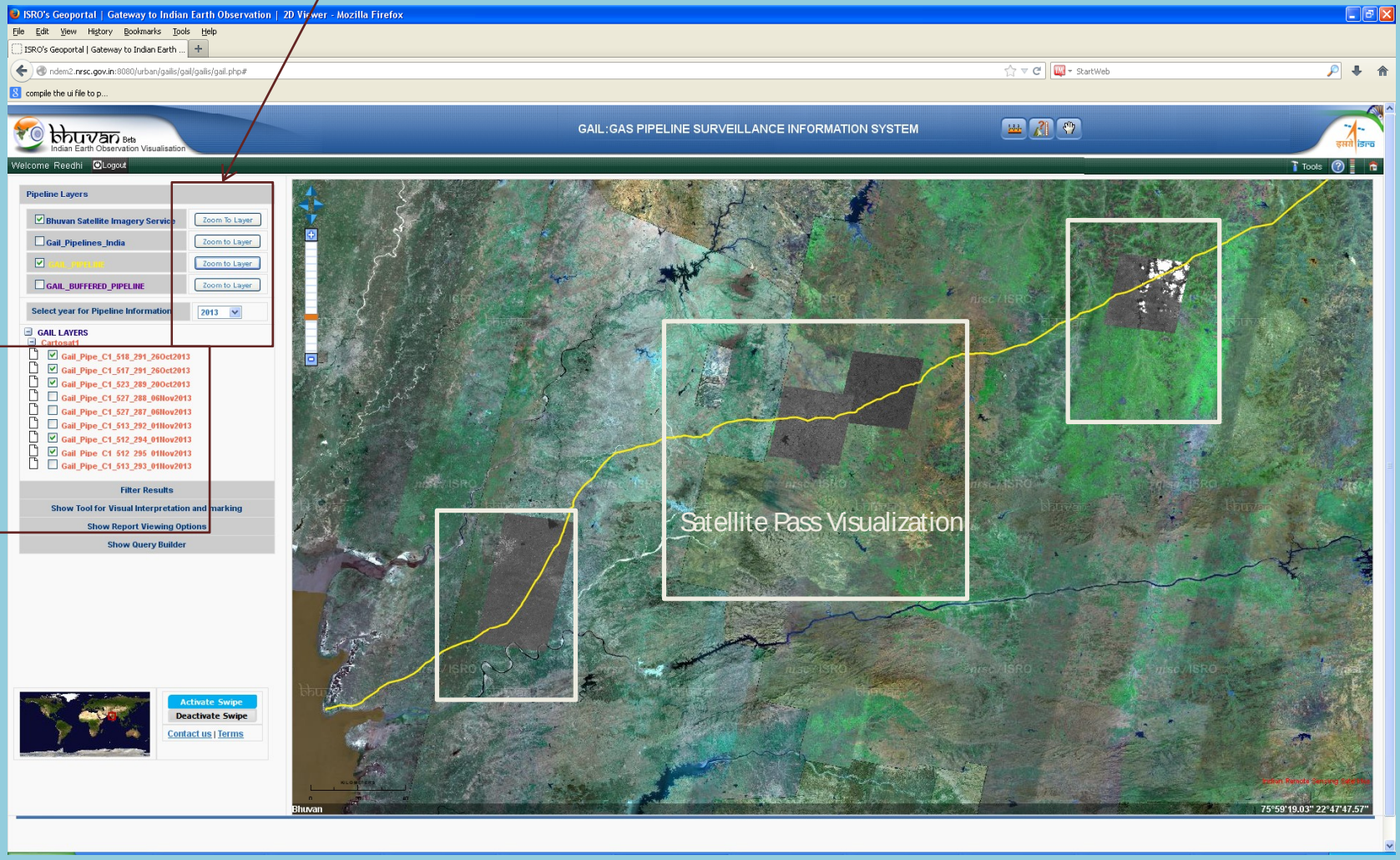
NUIS-Bhuvan- QGIS



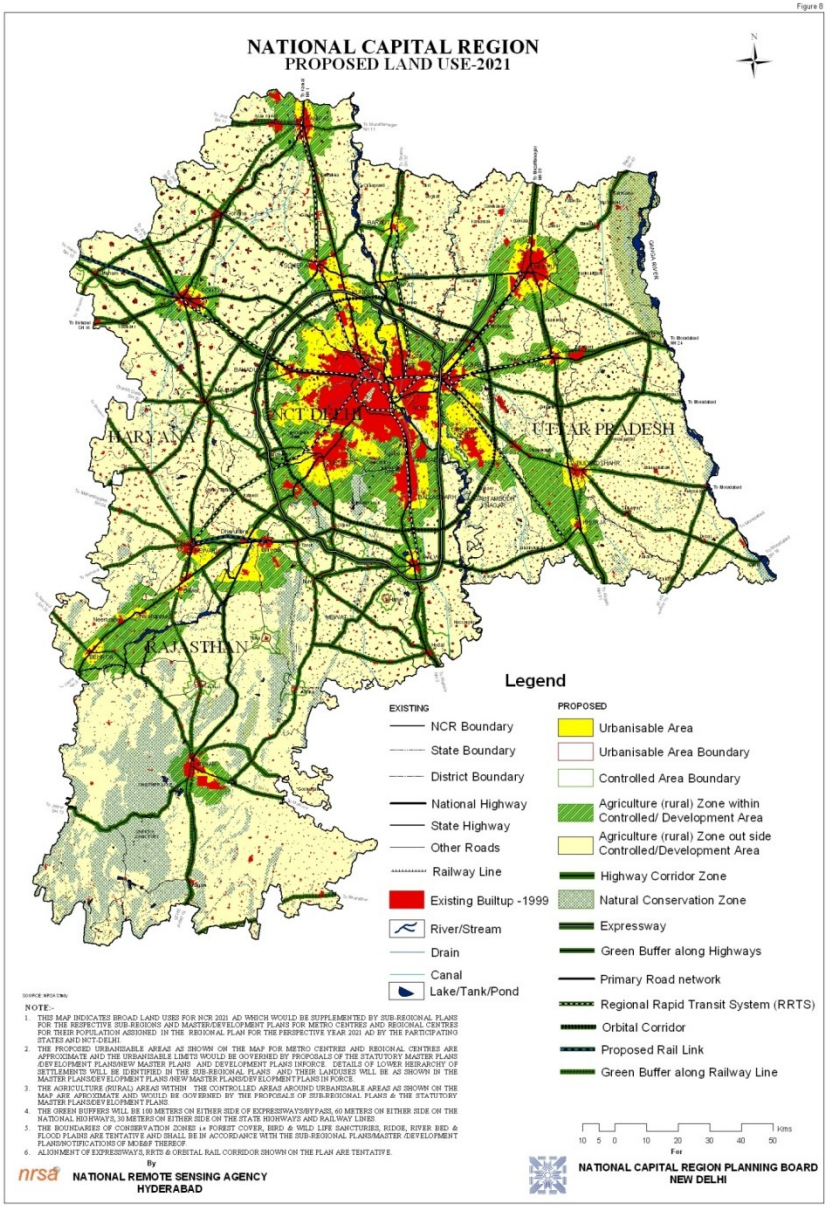
Satellite Data Visualization and Layer Tree

Zoom to Layers Extents

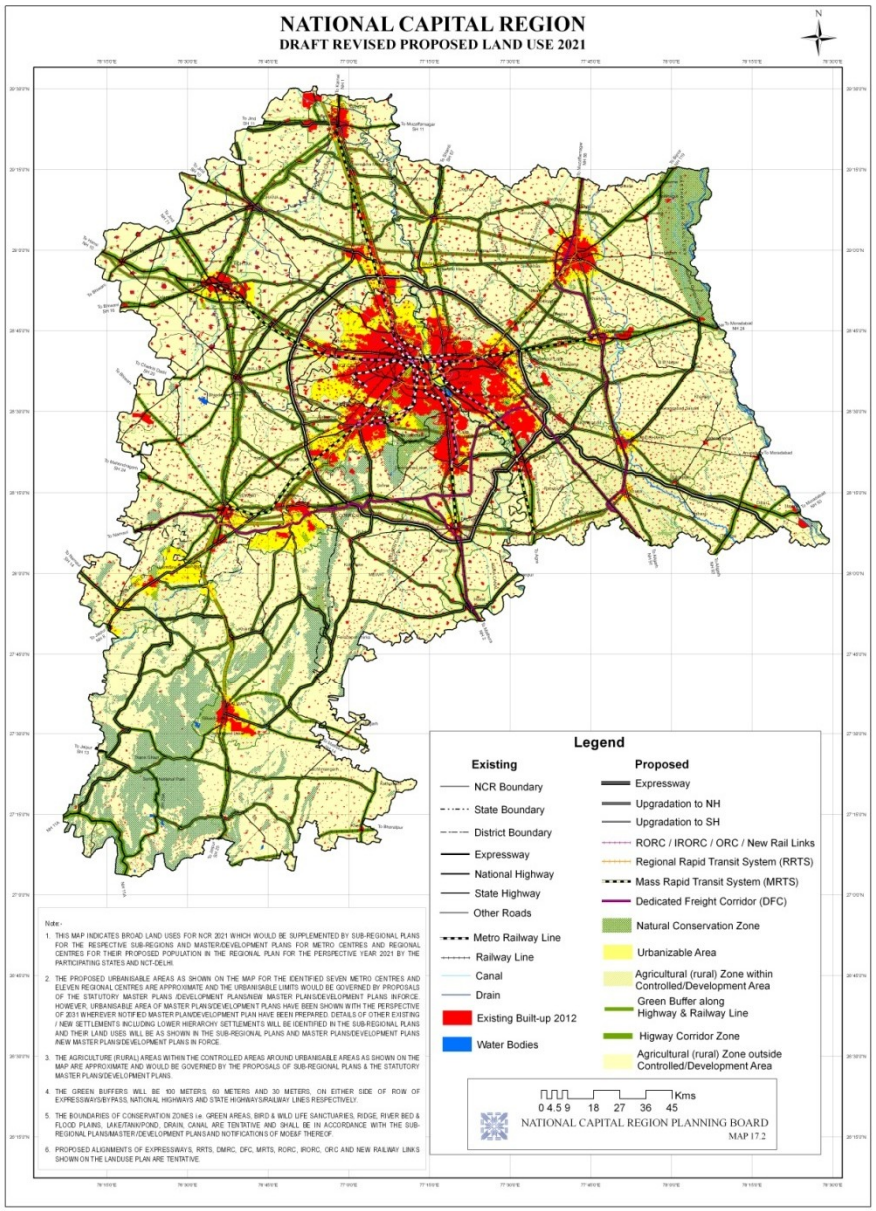


Satellite Pass Tree List

Proposed Landuse – 2021



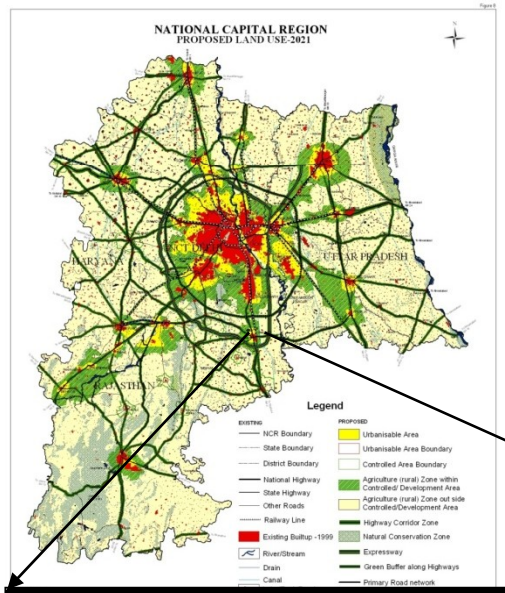
Proposed Landuse – 2021 (Revised)

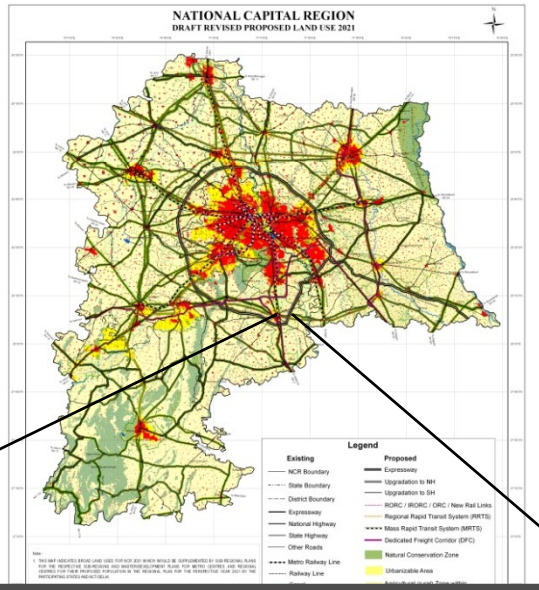


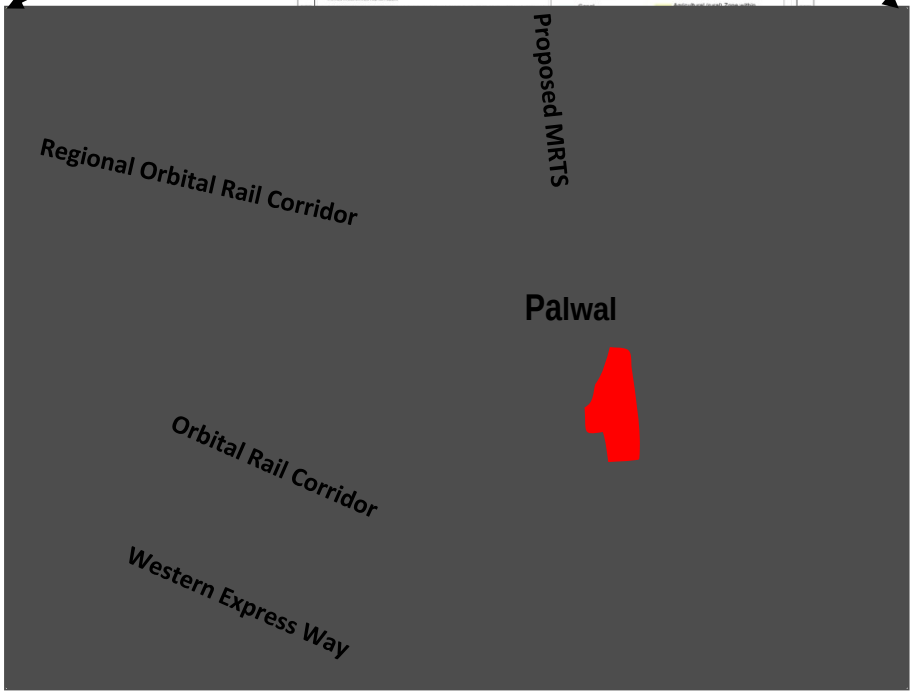
RP 2021

DRRP 2021

- Controlled area boundaries are revised.
- Urbanisable areas revised in Haryana & Rajasthan.
- Major transport corridors like DFC, Orbital rail, Regional transit systems, New rail links are incorporated.
- Upgradation of major roads to NH /SH proposed.







Proposed Landuse – 2021

Proposed Landuse – 2021 (Revised)

Lakes in NCR in 1970,1999 , 2011 & 2012

			Area in hectares			
Sub-Region	**Name of the Lake**	**Description**	**SOI TOPOSHEET (~1970)**	**1999**	**2011**	**2012**
NCT-Delhi	Bhalswa	Water extent	53.19	38.79	52.42	54.84
		Area under Dry	6.86	0	0	0
		Total Area	**60.05**	**38.79**	**52.42**	**54.84**
	Najafgarh	Water extent	0	1.9	11.38	15.39
		Area under Dry	0	1.42	5.01	0
		Total Area	**0**	**3.33**	**16.39**	**15.39**
Haryana	Kotla	Water extent	2209.32	0	779.78	0
		Area under Dry	0	1597.33	988.58	1556.38
		Total Area	**2209.32**	**1597.33**	**1768.36**	**1556.38**
	Sultanpur	Water extent	118.46	5.26	46.18	22.81
		Area under Dry	0	60.43	24.19	41.19
		Total Area	**118.46**	**65.69**	**70.37**	**64**
	Damdama	Water extent	115.96	58.97	70.71	41.29
		Area under Dry	0	7.83	8.23	15.53
		Total Area	**115.96**	**66.8**	**78.94**	**56.82**
	Surajkhund	Water extent	2.02	1.8	0	0
		Area under Dry	0	0	2.56	2.56
		Total Area	**2.02**	**1.8**	**2.56**	**2.56**
	Bhadkal	Water extent	42.09	37.64	11.31	0
		Area under Dry	0	2.25	13.42	28.97
		Total Area	**42.09**	**39.89**	**24.73**	**28.97**
	Bhidawas	Water extent	0	434.04	434.04	434.04
		Area under Dry	0	0	0	0
		Total Area	**0**	**434.04**	**434.04**	**434.04**
Rajasthan	Siliserh	Water extent	224.43	184.91	275.36	239.82
		Area under Dry	0	0	8.03	0
		Total Area	**224.43**	**184.91**	**283.4**	**239.82**

- Delineation done using visual interpretation from SOI Toposheet (~1970), LISS 3 (Mar - Apr 1999), LISS 3 (Oct 2011) & LISS IV (Mar- Apr 2012) satellite data.
- The area is delineated as visible on the particular satellite image and Ground Truth for further verification, if required

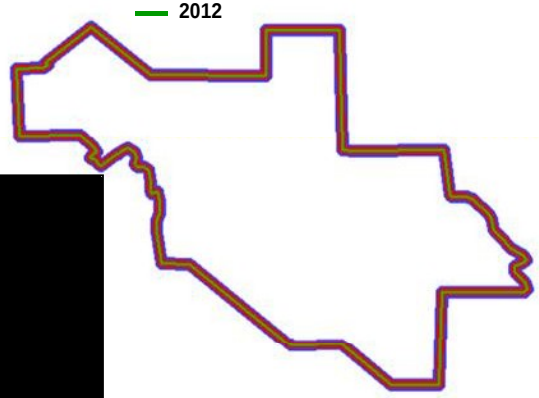
Avr. rainfall of 2mm in Mar-Apr 1999.
Avr. rainfall of 145mm in Sept. 2011 , Nil in Oct.2011.
Avr. Rainfall of 1mm in Mar – Apr 2012.

Bhidawas Lake

SOI MAPSHEET

1999

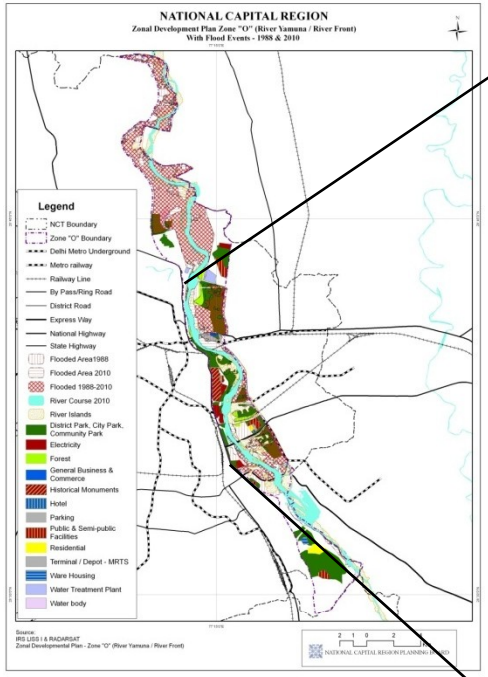
Field Photo – 10th Dec,2012

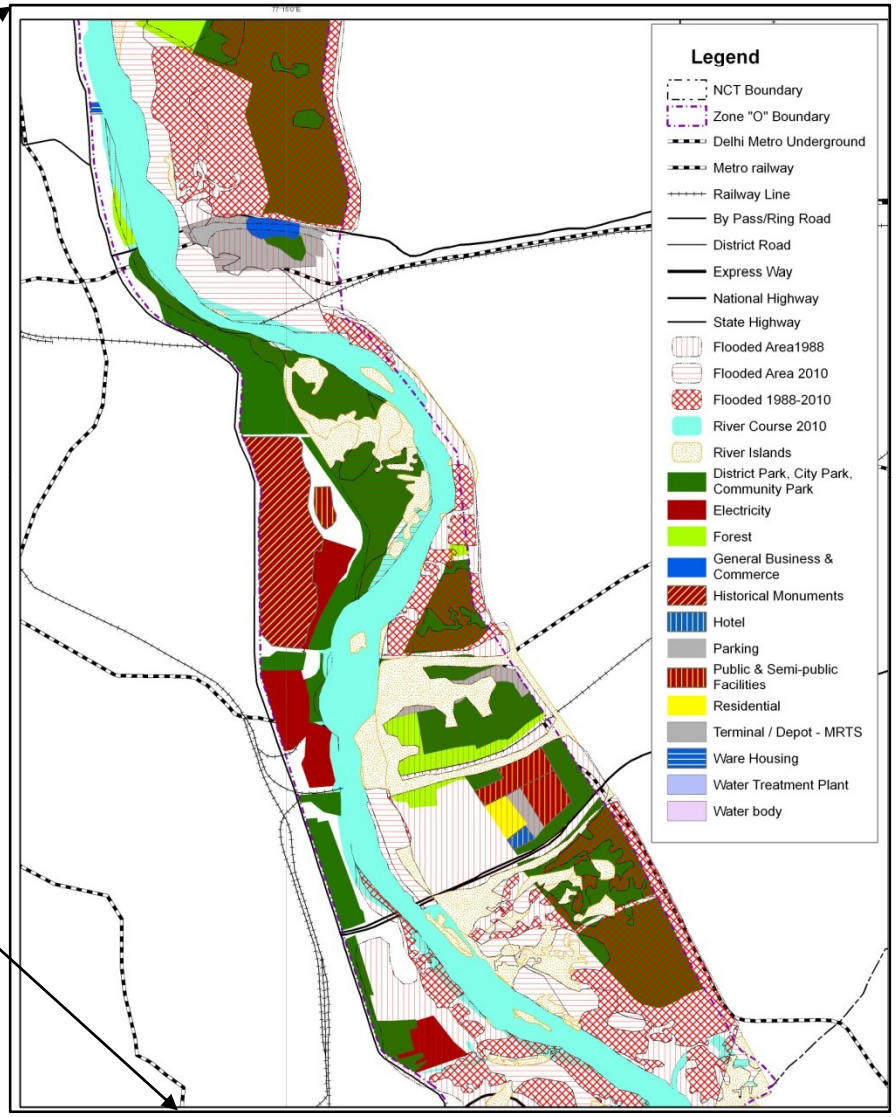


2011

2012

Zonal Development Plan Zone "O" (River Yamuna / River Front) with Flood Events

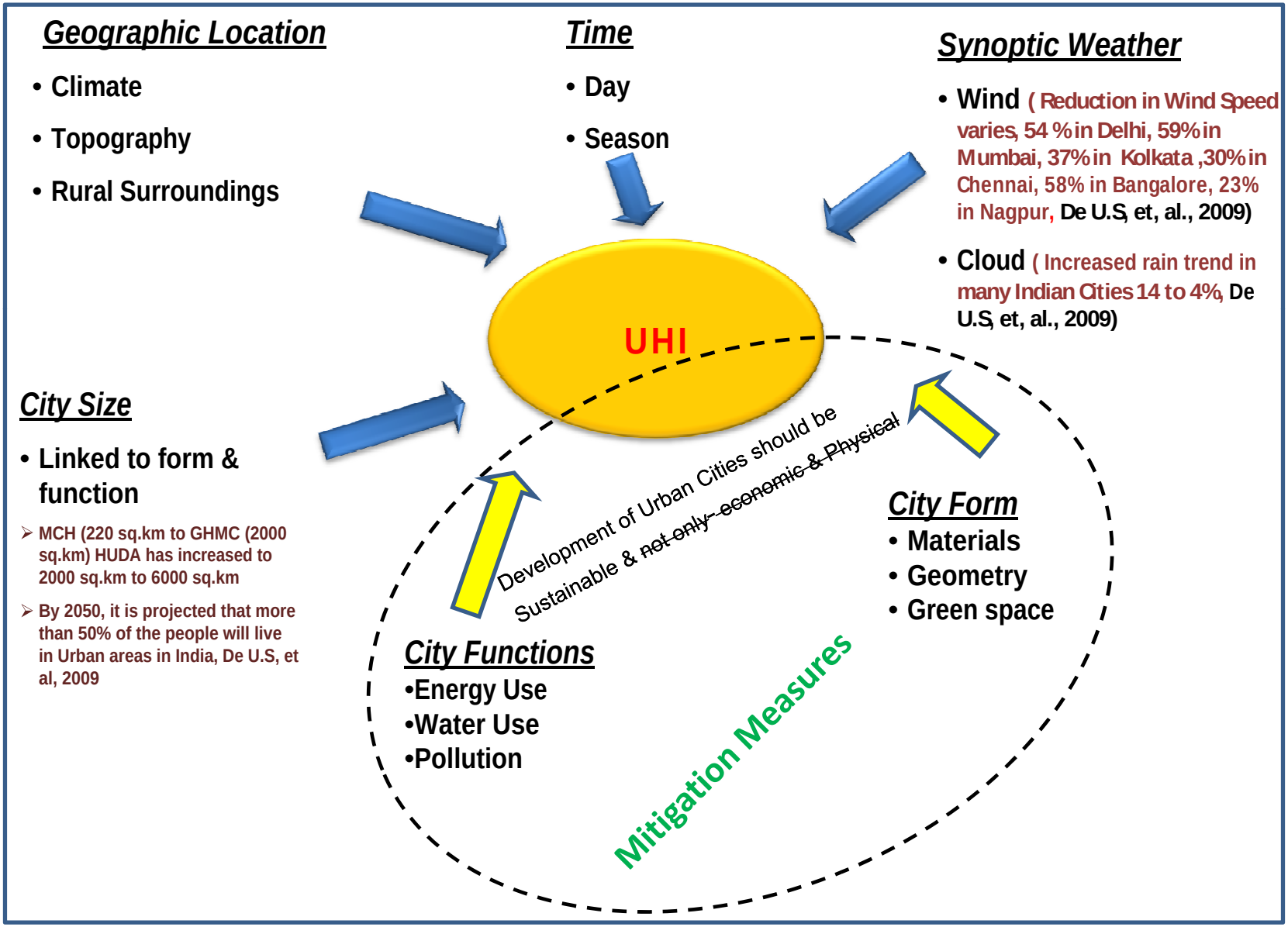




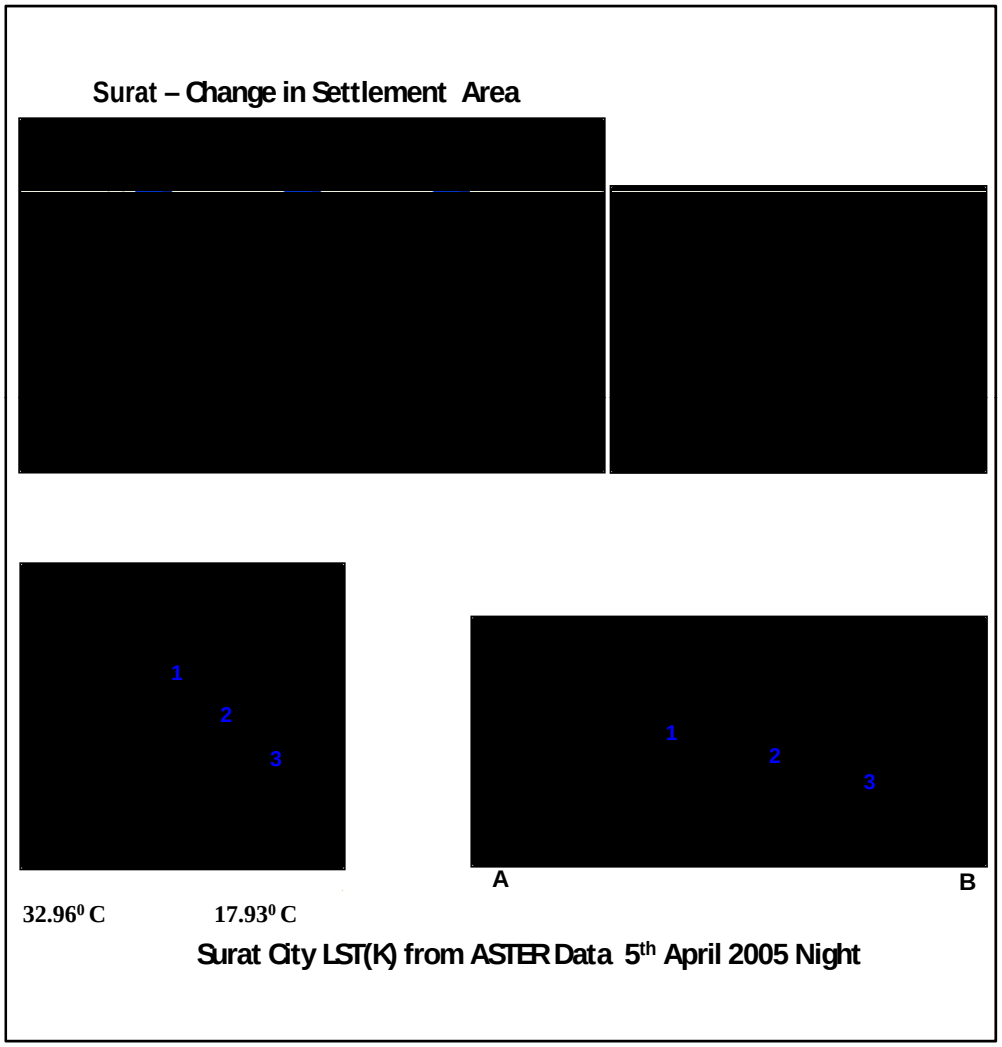
In the O Zone layer, major recreational areas like Commonwealth games and Public Utilities like Gas power station, Transportation nodes like MRTS terminial are present and are located in areas flooded during 1988 & 2010 flood events.

Existing large scale map cover lay on Cartosat-2 ortho image and Updation

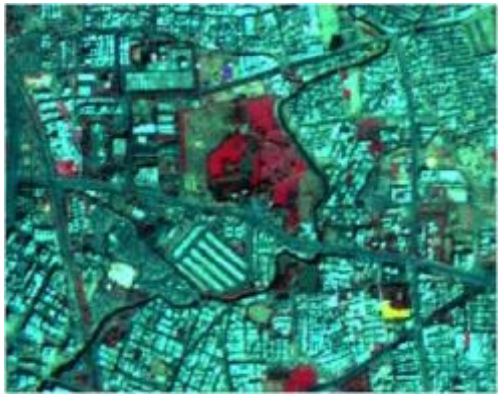
Factors Affecting Urban Heat Islands



Influence of Urbanization on Urban Heat Island From Space Based Multi Sensor Data



1. Dense Built-up

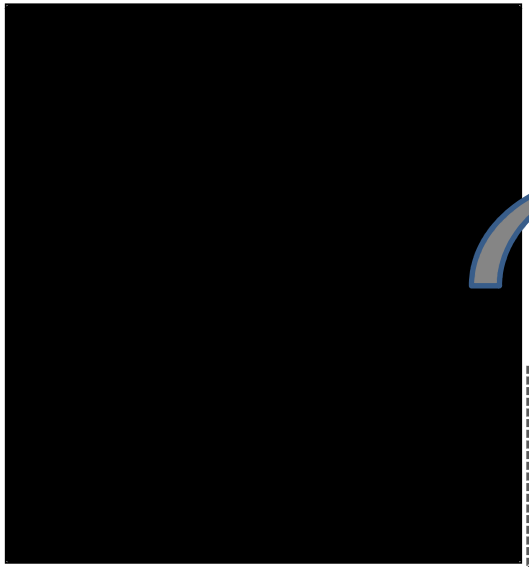


2. Open Space

3. Rural

Urban Micro-Climate

Geospatial information on urban morphology to facilitate understanding of urban heat islands and providing urban advisories towards sustainable habitat

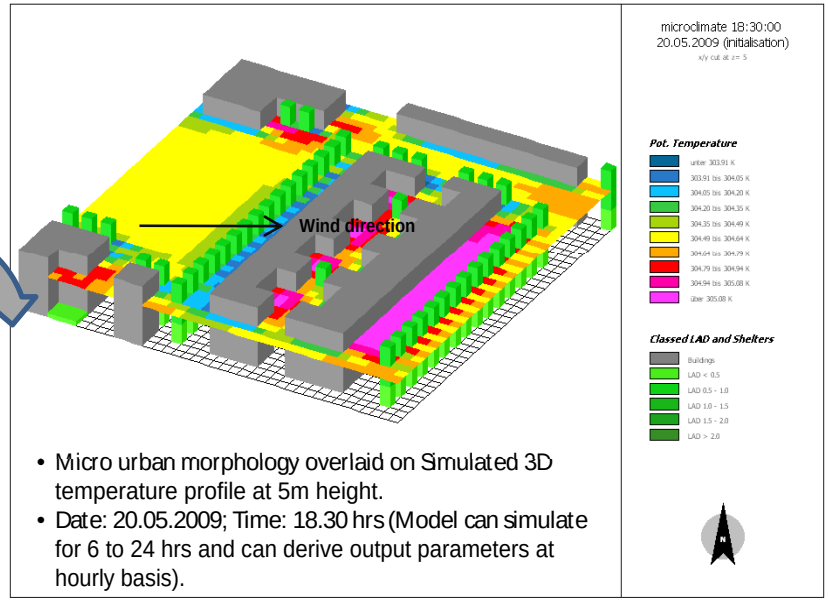


Model Inputs

1. Grid based Micro Urban morphology (Urban structures planimetry and height, vegetation and surface type parameters, …)
2. AWS parameters at Simulation. Initialization time.

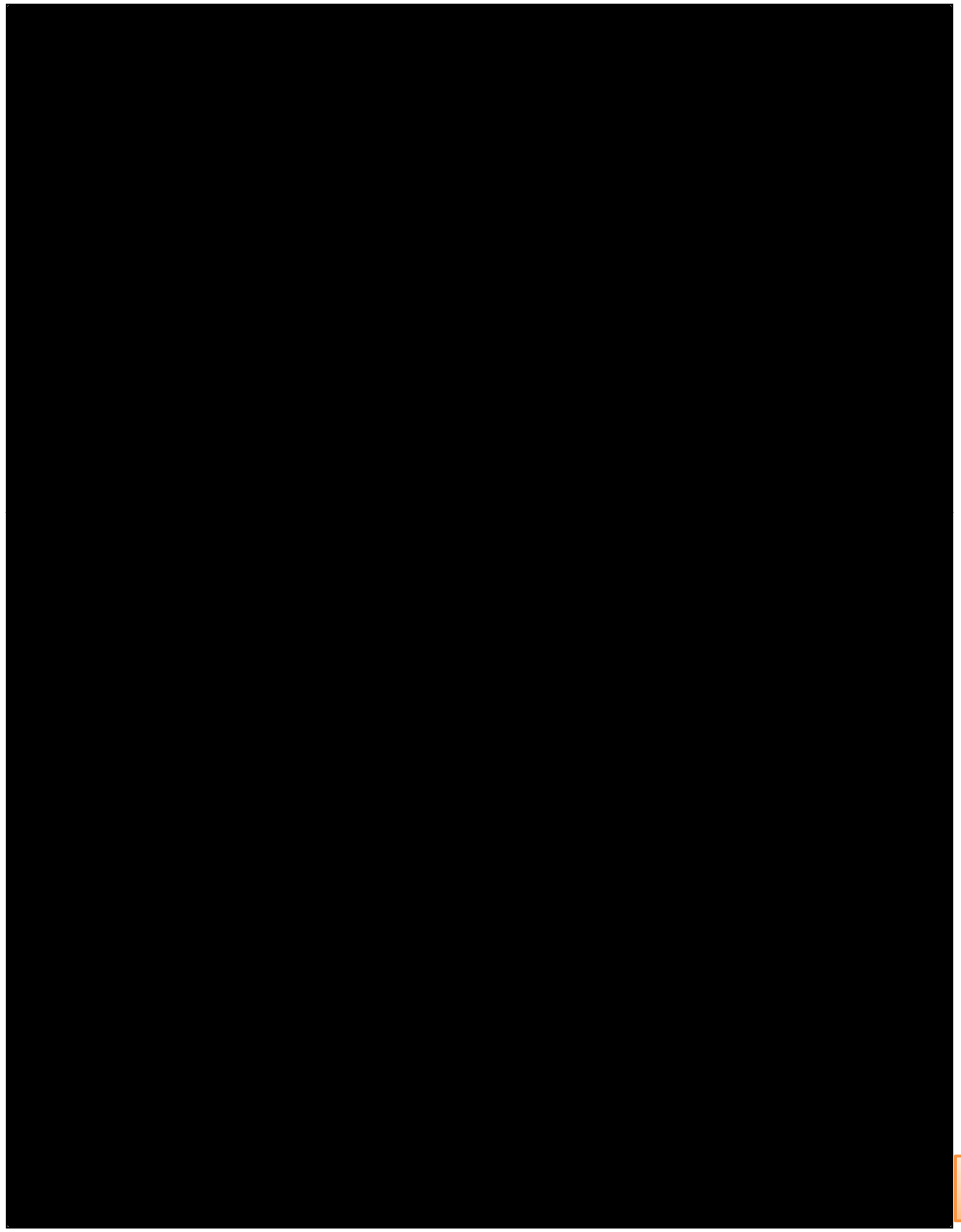
3D and non-hydrostatic microclimate model based on fundamental laws of fluid and thermo dynamics.

- **Proof of concept for Micro - level modelling (using Envi-Met model) based on urban morphology to derive the 2D and 3D parameters such as temperature, wind patterns, short & long-wave radiation vectors for UHI computation has been done for two test sites in Delhi.**

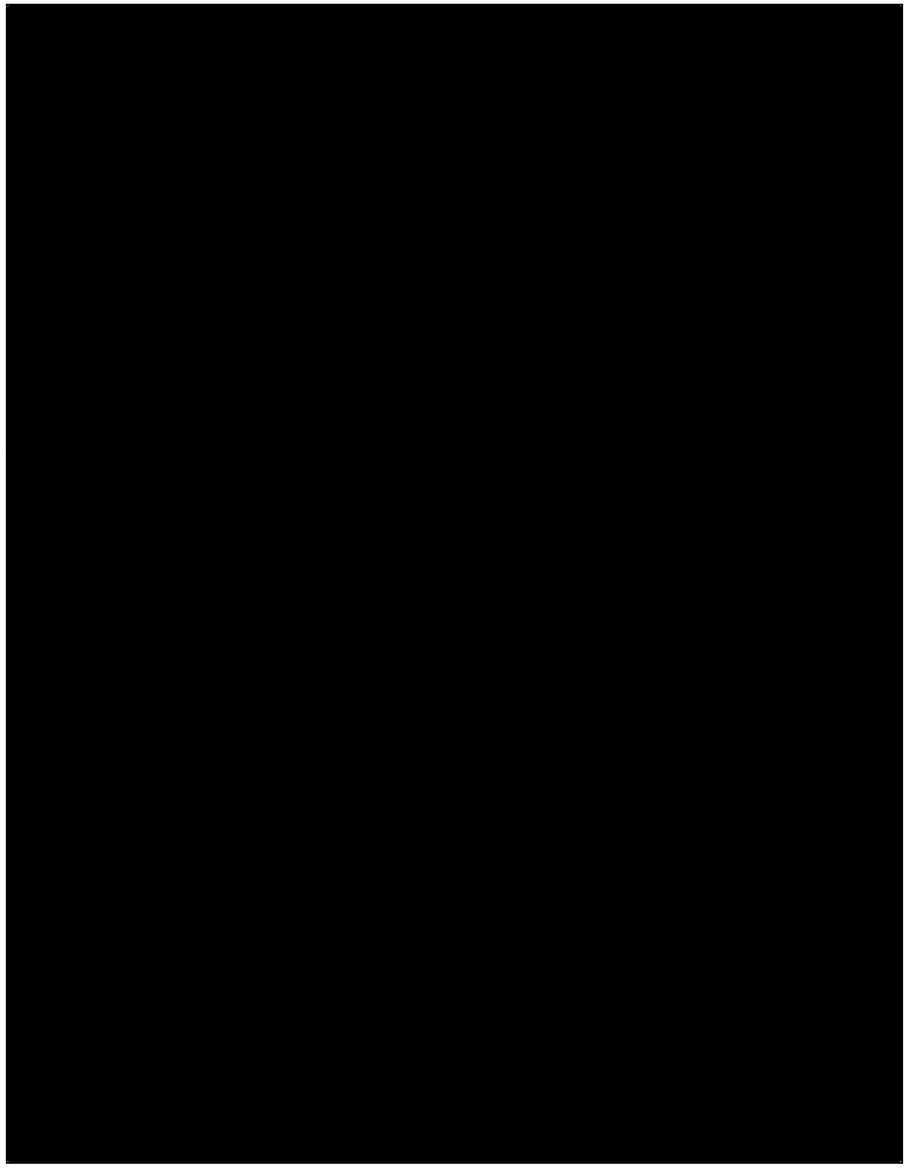


- Micro urban morphology overlaid on Simulated 3D temperature profile at 5m height.
- Date: 20.05.2009; Time: 18.30 hrs (Model can simulate for 6 to 24 hrs and can derive output parameters at hourly basis).

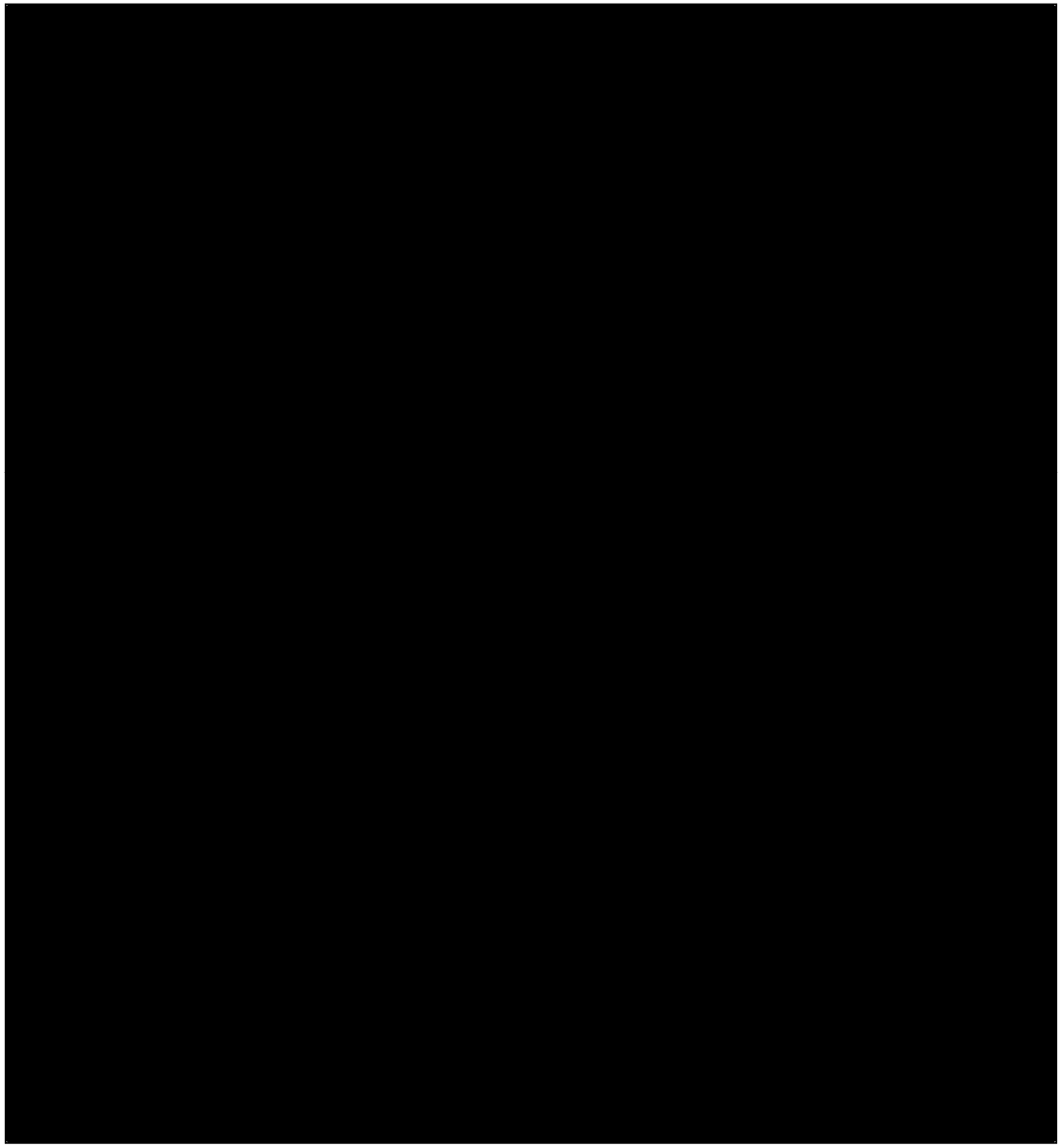
Temperature below 303.91 K Temperature above 305.08 K



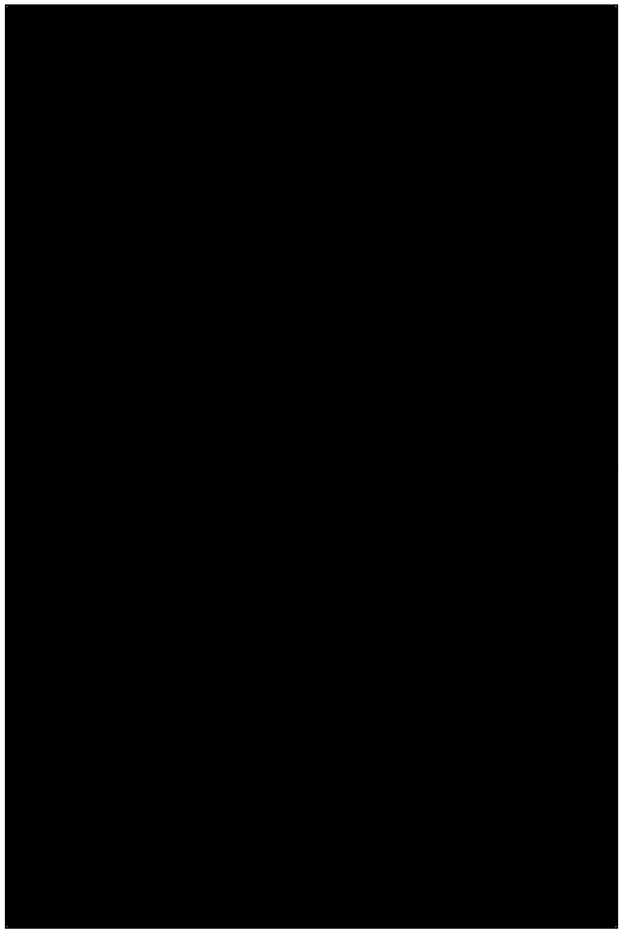
Building Rooftop area in %



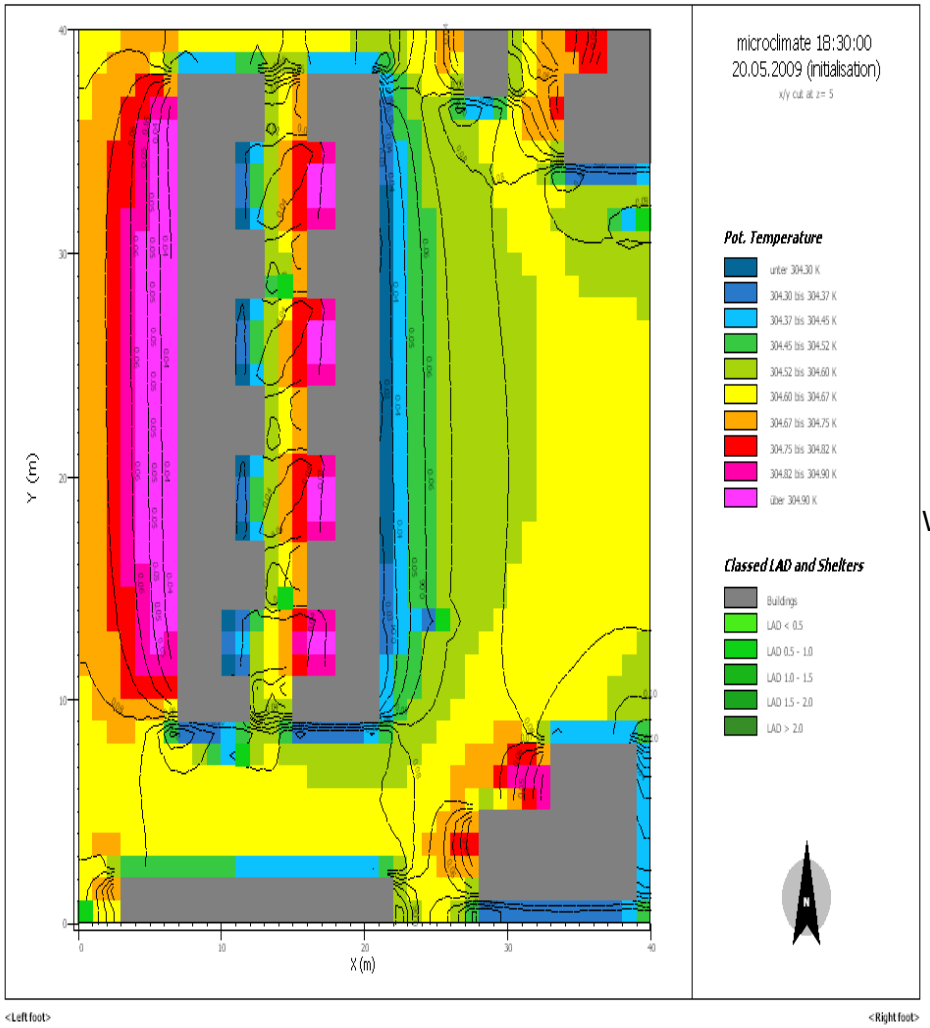
Vacant area in %



Pilot Study area
Part of Nanakpura –
New Delhi



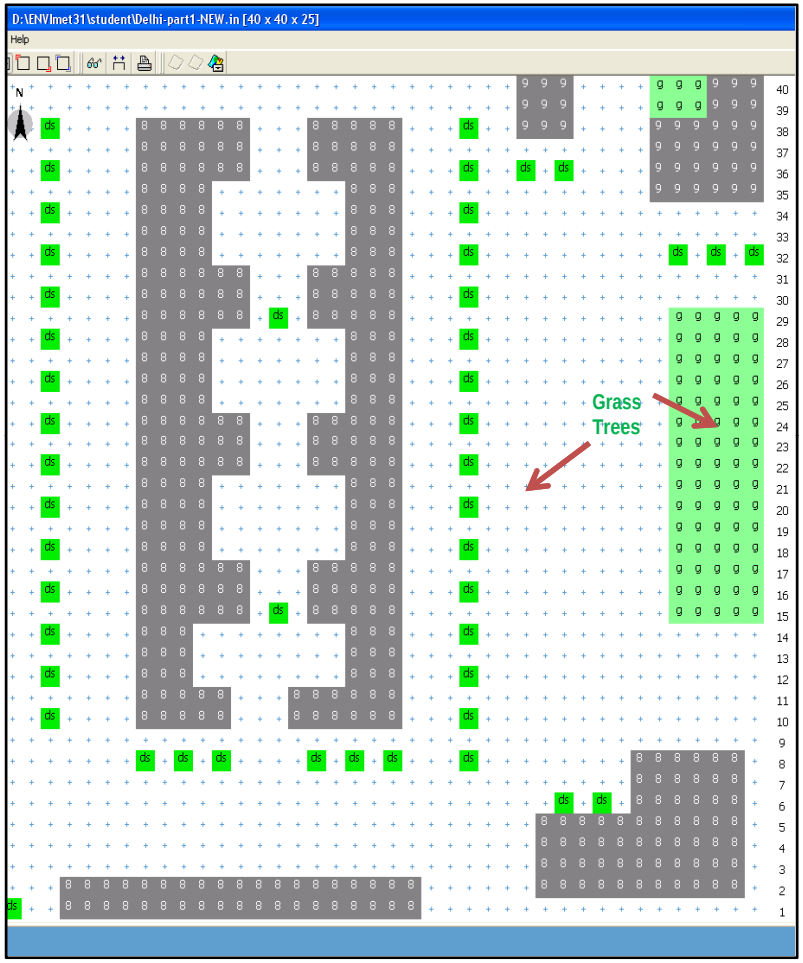
Existing Urban Setup in 40 X 40 Grid
(number represent height)

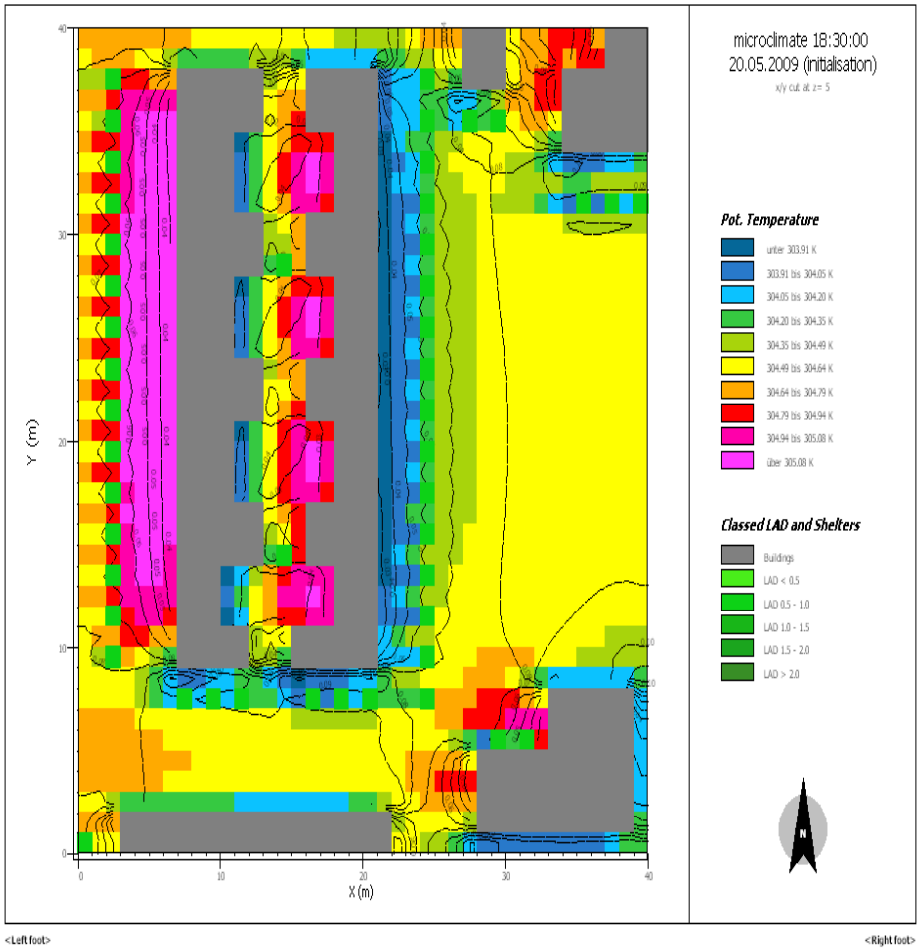


3D Temperature Profile

Wind Direction

Wind Direction

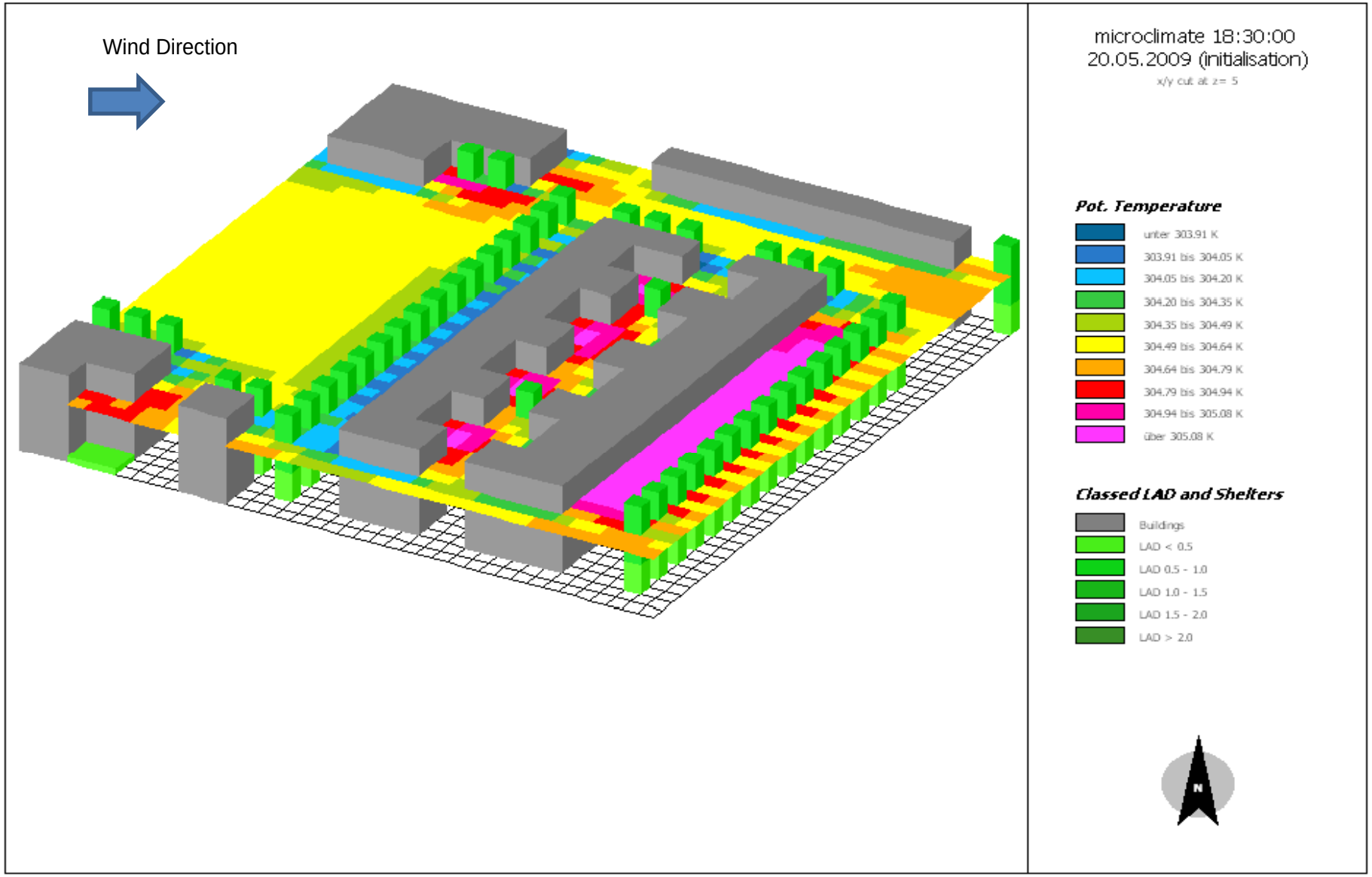




Additional Trees & grass added in the Model

Simulated 3D Temperature Profile

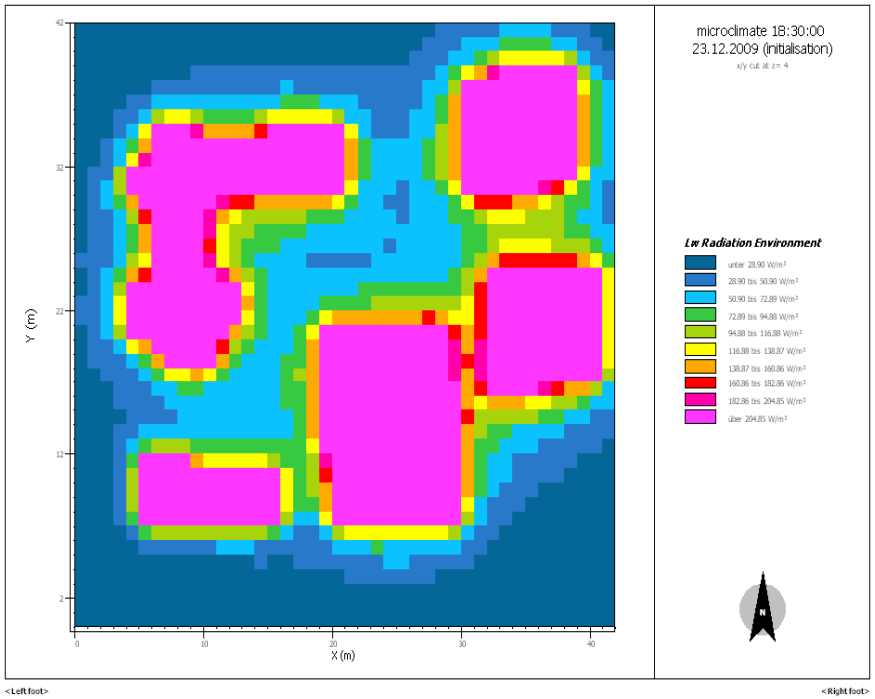
3D Temperature Profile at 5m Height

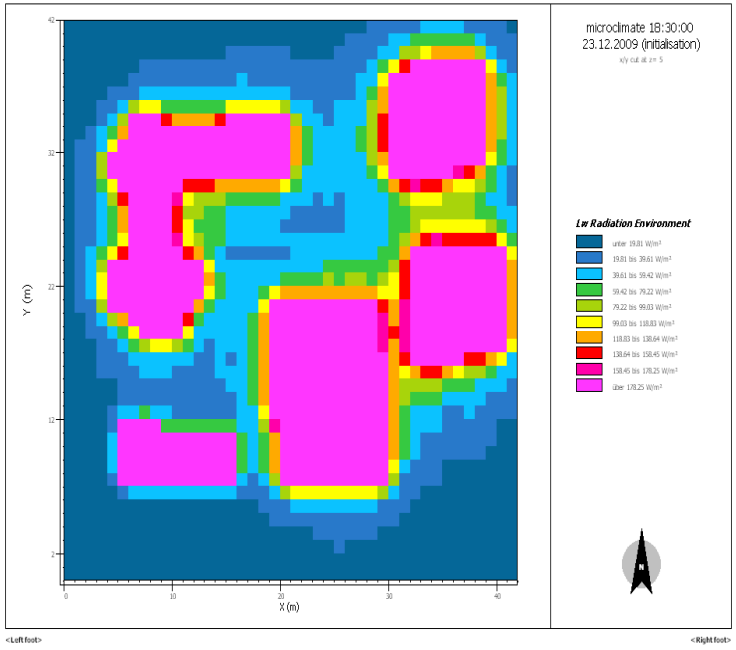


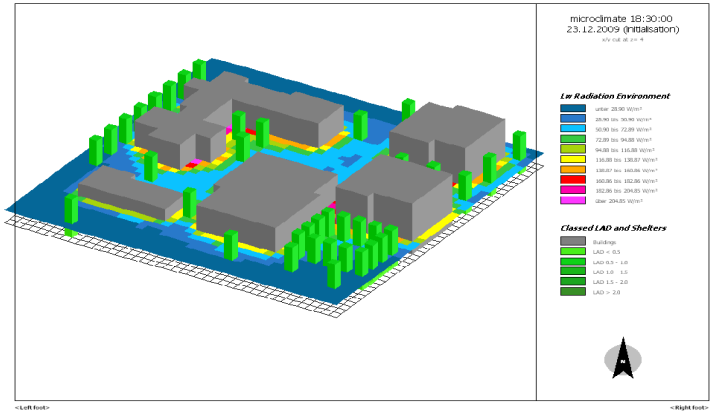
<Left foot>

<Right foot>

Long wave Radiation







Conclusions

- Urban Planning and applications require multi-scale scientific geospatial data Remote Sensing data is excellent, cost effective source for creating / updating cartographic data base.

- Mobile Ground based attribute collections is useful way to integrate spatial & attribute data in near real time.

- NRSC/ISRO & TCPO/MoUD working towards operationalzation of Bhuvan platform to meet the ULBs Geospatial needs.

Thank you